



# Intel® 852GME Interactive Client Reference Design

User's Guide

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*October 2003*

Order Number: 274000-001



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## Revision History

Date	Revision	Description
October 2003	001	First Release of Document

## 1.1 About this Manual

This document describes the features of the Intel® 852GME Interactive Client Reference Design and guides the reader in use of the reference board. Read this document in its entirety before applying power to the motherboard. More information on the Intel® 852GME Chipset is available at the following website: <http://developer.intel.com/design/chipsets/embedded/852gme.htm>

## 1.2 Manual Organization

Chapter 1, “Introduction” provides information on related literature and customer support.

Chapter 2, “System Overview,” introduces the features of the Intel 852GME Interactive Client Reference Design.

Chapter 3, “Getting Started” provides instructions for configuring the system board and provides information about connectors on the board.

Chapter 4, “Technical Reference” describes the component features and specifications of the reference design. It also provides information about the chipset, cache memory and main memory system. This chapter includes reference information for connectors on the board.

Appendix A, “Bill of Materials” provides the Bill of Materials (BOM) for the Intel 852GME Interactive Client Reference Design.

Appendix B, “Schematics” provides the schematic drawings for the reference design.

## 1.3 Technical Support

The Intel Developer website (<http://developer.intel.com/>) provides up-to-date technical information and product support. This information is available 24 hours per day, 7 days per week, providing technical information whenever you need it.

For a commercially available product based on this reference design, contact Portwell\* at: <http://www.portwell.com/>

The BIOS is created and supported by American Megatrends Inc.\*. For more information, visit: <http://www.ami.com/>

Technical questions for this reference design can be sent to Intel at [interactiveclient@intel.com](mailto:interactiveclient@intel.com).

## 1.4 Product Literature

Product literature can be ordered from the following Intel literature centers:

**Table 1. Intel Literature Centers**

Location	Telephone Number
U.S. and Canada	1-800-548-4725
U.S. (from overseas)	708-296-9333
Europe (U.K.)	44(0)1793-431155
Germany	44(0)1793-421333
France	44(0)1793-421777
Japan (fax only)	81(0)120-47-88-32

## 1.5 Related Documents

**Table 2. Related Documents**

Document Title	Order Number
Intel® Pentium® 4 Processor with 512 KB L2 Cache on 0.13 Micron Process Datasheet	298643
Intel® Pentium® 4 Processor in the 478-Pin Package Thermal Design Guidelines	249889
Mechanical Enabling for the Intel® Pentium® 4 Processor in the 478-pin Package	290728
Intel® 82801DB I/O Controller Hub 4 (ICH4) Datasheet	290744
Intel® 855GME and 852GME Chipset: Thermal Design Guide for Embedded Applications	273838
Intel® 82801DB I/O Controller Hub 4 (ICH4): Thermal and Mechanical Design Guidelines	298651
Intel® Pentium® M Processor and Intel® 852GME/855GME Chipset Embedded Platform: Design Guide	273903
Intel® Pentium® 4 Processor for Embedded Applications Thermal Design Guide	273704
Voltage Regulator Down 10.0 Design Guidelines	252885
EmbeddedATX Motherboard Interface Specification	Register to download at <a href="http://developer.intel.com">developer.intel.com</a>

## 1.6 Terms and Definitions

The following table defines terms used in this manual.

**Table 3. Terms and Definitions (Sheet 1 of 2)**

Term	Definition
A	Amps (Amperes)
AC'97	Audio Codec 97
ACPI	Advanced Configuration Power Interface
AGP	Accelerated Graphics Port
AGTL	Assisted Gunning Transceiver Logic
ATA	Advanced Technology Attachment
ATM	Automatic Teller Machine
ATX	A motherboard form factor and standard for power supplies (not an acronym)
BGA	Ball-Grid Array
BIOS	Basic Input/Output System
CD	Compact Disk
CM	Contract Manufacturer
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processing Unit
DDR	Double Data Rate
DIMM	Dual Inline Memory Module
DVI	Digital Video Interface
ECC	Error Correcting Code, Error Checking and Correcting
EHCI	Enhanced Host Controller Interface
EmbaTX	EmbeddedATX motherboard interface specification
EMS	Electronic Manufacturing Service
FC	Flip-Chip
FWH	Firmware Hub
Gbyte	Gigabyte
GHz	Gigahertz
GTL	Gunning Transceiver Logic
Hz	Hertz
I/O, IO	Input/Output
ICH	I/O Controller Hub
IDE	Integrated Device/Drive Electronics
IRQ	Interrupt Request
JEDEC	Joint Electron Device Engineering Council (electronics trade association)
KB/M	Keyboard/Mouse
Kbytes	Kilobytes (1 Kbyte = 1024 bytes)

Table 3. Terms and Definitions (Sheet 2 of 2)

Term	Definition
k $\Omega$ , K $\Omega$	Kilo ohms
L2	Level 2
LAN	Local Area Network
LED	Light-Emitting Diode
LPC	Low Pin Count
LVDS	Low-Voltage Differential Signaling
Mbyte	Megabyte
MCH	Memory Controller Hub
$\mu$ F	Microfarads
MHz	Megahertz
mPGA	Micro Pin-Grid Array
ms	Milliseconds
$\mu$ s	Microseconds
mW	Milliwatts
$\mu$ W	Microwatts
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
PCI	Peripheral Component Interconnect
PCM	Pulse Code Modulation
PGA	Pin-Grid Array
PIO	Programmed Input/Output
POS	Point-of-Sale
POST	Power-On Self-Test
RAM	Random Access Memory
ROM	Read-Only Memory
RTC	Real-Time Clock
s, sec	Seconds
SDRAM	Synchronous Dynamic RAM
SIMD	Single Instruction Multiple Data
SIO	Super I/O
SSE	Streaming SIMD Extensions
SST	Source-Synchronous Transfer
UHCI	Universal Host Controller Interface
USB	Universal Serial Bus
V	Volts
$\Omega$	Ohms
W	Watts
ZIF	Zero Insertion Force



## 2.1 Overview

The Intel® 852GME Interactive Client Reference Design will help OEMs and CMs bring products to market quickly by providing a standard space platform. This platform allows for flexible development of interactive client applications such as POS devices, ATMs, kiosks, gaming terminals, and other display-centric embedded clients.

Using the Pentium® 4 processor, the Intel 852GME Interactive Client Reference Design employs advanced multimedia and thermal management, an Intel architecture development environment and scalable performance. One design is able to provide multiple options for processor and usage. The features of this design are outlined in [Section 2.2](#) below.

Developers can design products that meet customer needs by using POS/kiosk features such as:

- Low-cost design
- Dual independent display
- Advanced remote manageability
- EmbATX form factor for low-profile and small footprint applications.

The use of the EmbATX specification ensures a small profile for the Intel 852GME Interactive Client Reference Design. With the capability of servicing a large variety of applications, the EmbATX specification allows OEMs, ODMs, EMSs and CMs to reuse design elements and reduce cost while incorporating innovative features of a highly competitive market for hardware building blocks. At the same time, EmbATX allows OEMs to standardize a consistent form factor for enclosures, display housings, and external chassis, which will reduce the cost to develop new systems and upgrade systems.

## 2.2 System Features

The major features of the Intel 852GME Interactive Client Reference Design include:

- Pentium 4 processor
  - Scalable performance supporting either the Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process or the Intel® Celeron® processor
  - Intel NetBurst® microarchitecture, Streaming SIMD Extensions 2 (SSE2) Instructions, and Intel® MMX™ media enhancement technology
  - Available in mPGA478 form factor
- Intel® 852GME Chipset Graphics Memory Controller Hub (GMCH)
  - Intel® Extreme Graphics 2 technology
  - Integrated Low-voltage Differential Signal (LVDS) interface
  - Dual independent display
  - Supports 400 and 533MHz processor system bus support
  - 200/266 MHz DDR SDRAM
  - Up to 2 Gbytes with 2 DIMM slots
  - 732 pin Micro-FCBGA package
  - Intel® 82801DB I/O Controller Hub 4 (ICH4)
    - 421-ball mBGA package
    - Dual-channel ATA-100 for up to four devices
    - SMBus 2.0
    - Six USB 2.0/1.1 ports
    - Integrated AC'97 support
- Advanced I/O
  - DVI and VGA for digital and analog monitor support
  - Four 16550C compatible serial ports, parallel port, mouse/keyboard PS/2 ports
  - Three powered USB ports and three standard USB ports
  - 10/100/1000 Ethernet provided by choice of three different Ethernet controllers
    - Intel® 82551QM
    - Intel® 82540EM
    - Intel® 82562EZ
  - Low-profile PCI expansion via PCI riser
- Form factor: EmbeddedATX
  - 9.6" x 9.6" x 2" overall dimensions

## 3.1 Intel® 852GME Interactive Client Reference Design Kit Contents

The following components are included in the Intel 852GME Interactive Client Reference Design kit:

- Intel® 852GME Interactive Client Reference Design system board
  - 2.8 GHz Pentium® 4 processor
  - Active thermal solution for Pentium 4 processor
  - BIOS from AMI\*
  - One 256 Mbyte non-ECC DIMM
- Collateral CD with instructions describing how to download the electronic design file

## 3.2 Before You Begin

To prevent damage to the system board, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from static electricity discharge:

- When handling the board, use a grounded wrist strap designed for static discharge elimination.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling processor chips or memory modules, avoid touching their pins or gold edge fingers. Put the system board and peripherals back into the antistatic bag when they are not in use or not installed in a chassis.

**Warning:** This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before connecting or disconnecting cables or installing or removing any system board components. Failure to do this can result in personal injury and/or equipment damage.

**Warning:** Avoid short-circuiting the lithium battery; this can cause it to overheat and cause burns if touched.

**Warning:** Although the Pentium 4 processor has built-in thermal management features, do not operate the processor without a thermal solution; otherwise, damage may occur.

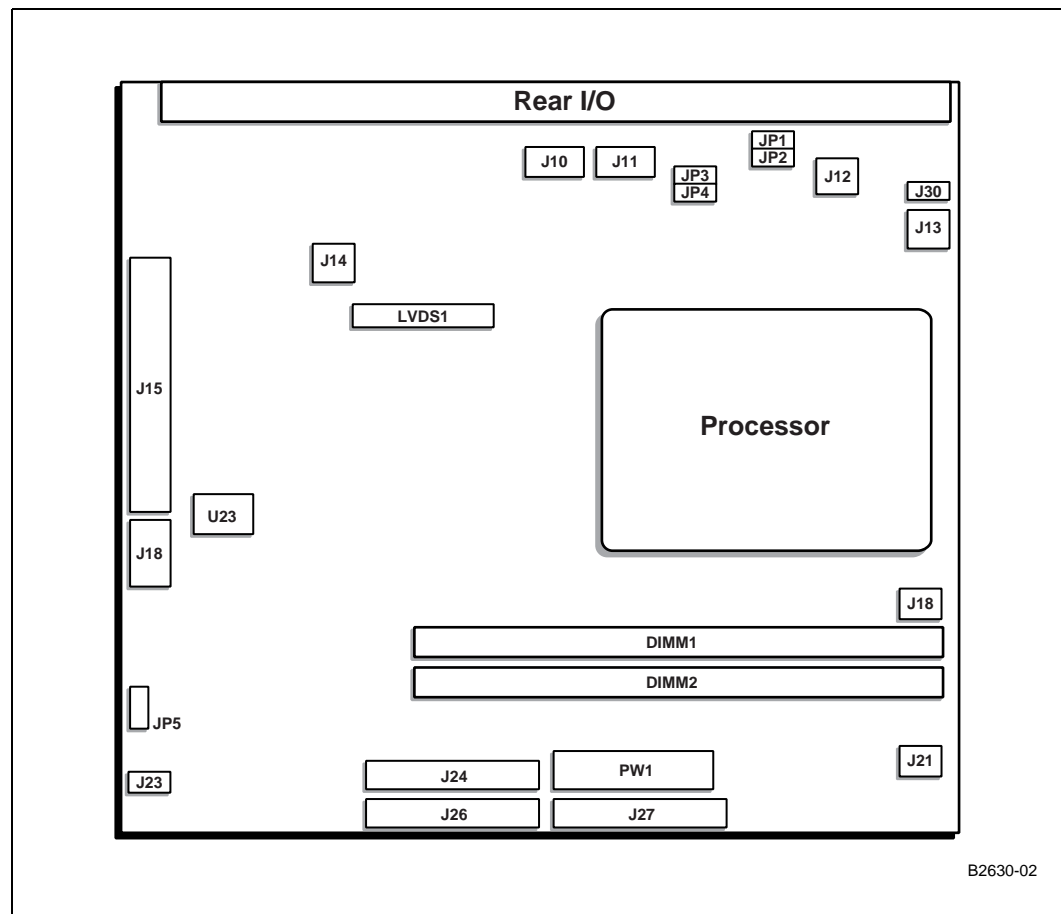
## 3.3 Initial Setup

To set up the system for operation:

1. If not already installed, install the system memory DIMM(s) into the DIMM socket(s).
2. If not already installed, attach the active thermal solution for the processor following the instructions in the Thermal Design Guide, ensuring it is plugged into its power supply at the CPU fan connector (see J18 in [Figure 1](#)).
3. Connect an ATX 12 V power supply to the board and to any drives to be powered. Make sure to connect both the standard ATX power connector and the additional 4-pin 12 V connector to the board.
4. Install desired peripheral devices such as a hard drive, CD-ROM, floppy drive, keyboard, mouse, and monitor.
5. Turn on the external power supply. The reference board will power up automatically because the system power signal is tied high. If the system does not power up, short the reset and ground pins (pins 5 and 7) on the power/LED header (connector J29-see schematics on the collateral CD).

**Note:** Ensure that the power supply is configured for the proper AC voltage based on the geographic location where the board is used.

Figure 1. Jumper Locations



## 3.4 Configuring the System Board

Configuring the jumpers is not required for standard operation. Jumper locations are shown in [Figure 1](#) and described in [Table 4](#). More information can be found in [Appendix B, “Schematics”](#).

I/O connectors are described in [Table 5](#). Approximate locations for these I/O connectors are shown in [Figure 2](#).

**Note:** This is not a comprehensive list of connectors. Refer to the schematic for any connectors not found in [Table 5](#).

**Table 4. Jumper Settings**

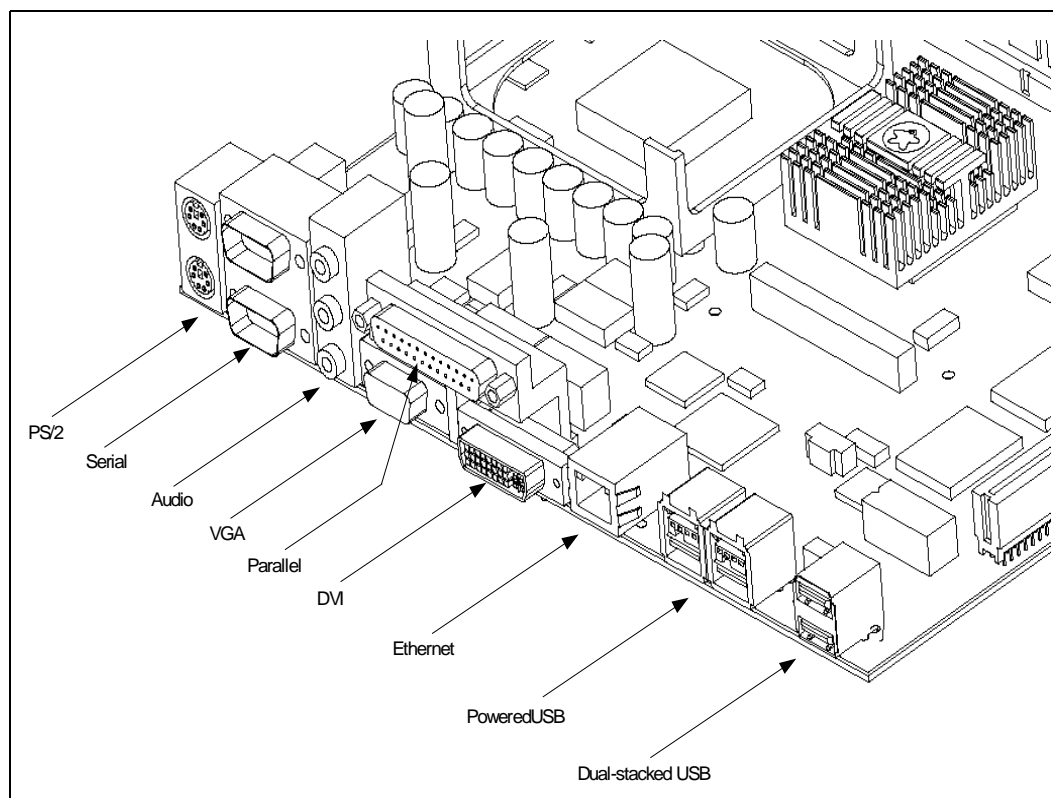
Jumper	Description	Setting
JP1	COM1 RI#/+12 V selection on pin 9	1-2 short, +12 V 2-3 short, RI#
JP2	COM2 RI#/+12 V selection on pin 9	1-2 short, +12 V 2-3 short, RI#
JP3	COM3 RI#/+12 V selection on pin 9	1-2 short, +12 V 2-3 short, RI#
JP4	COM4 RI#/+12 V selection on pin 9	1-2 short, +12 V 2-3 short, RI#
JP5	Clear CMOS	1-2 short, Clear CMOS Disable 2-3 short, Clear CMOS Enable

**Table 5. Connector Descriptions**

Connector	Description
J10	COM3 Serial Port (RS-232)
J11	COM4 Serial Port (RS-232)
J12	Rear fan connector
J13	+12 V auxiliary power connector for CPU (see ATX 12 V power supply spec)
J14	Audio CD-in Connector
J15	Main PCI riser connector
J16	Auxiliary PCI riser connector (see EmbATX spec)
J18	CPU fan connector
J21	Front fan connector
J23	External Wake On LAN Header
J24	Secondary IDE connector
J26	Primary IDE connector
J27	Floppy drive connector
J30	PS/2 keyboard/mouse header
DIMM1	First DIMM socket
DIMM2	Second DIMM socket
LVDS1	LVDS and backlight connector
PW1	Main ATX power connector
U23	BIOS socket

Figure 2 defines connectors in the rear I/O space located on the back of the motherboard.

Figure 2. Rear Panel I/O Connectors



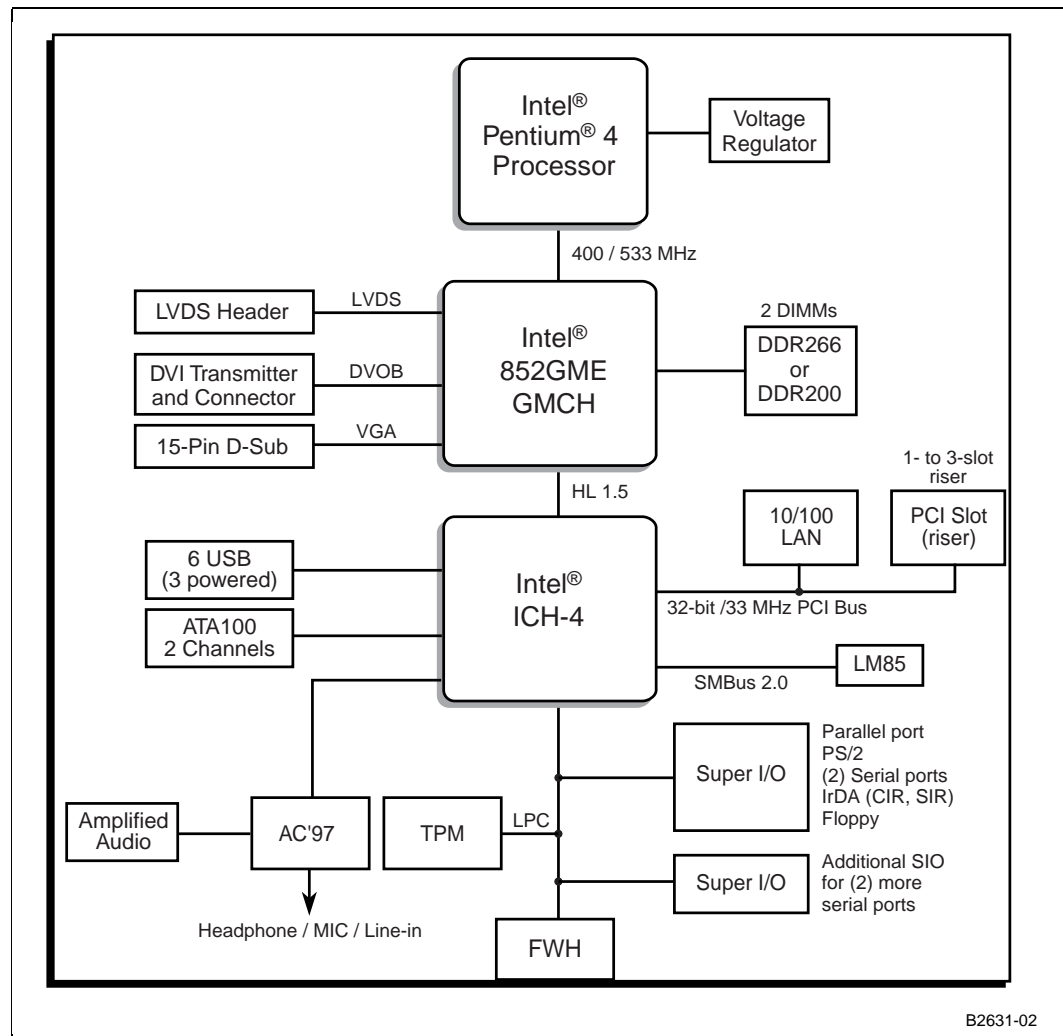
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## 4.1 Block Diagram

Figure 3 below provides a block diagram for the Intel® 852GME Interactive Client Reference Design.

**Figure 3. System Block Diagram**



## 4.2 Hardware Reference

This section describes the devices and connectors on the board.

### 4.2.1 System Board

- The system board is a 6-layer PCB composed of industry-standard FR4 material.
- The system board is 9.6" x 9.6", in compliance with the EmbATX specification.
- The system board includes an mBGA478B socket for mFC-PGA and mFC-PGA2 packages, supporting the Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process.
- 12 V active thermal solutions are required, and one supporting the Pentium 4 processor is included in the kit.
- An ATX 12 V-compliant power supply is required to provide power to this system board.

### 4.2.2 Processor

The following sections describe the features of the different processors supported on this platform. In addition, future processors may be drop-in compatible with this design. Contact Intel Support for further information. Contact information is listed in [Section 1.4](#).

#### 4.2.2.1 Pentium® 4 Processor with 512 Kbytes L2 Cache on 0.13 Micron Process

The Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process is a follow-on to the Pentium 4 processor in the 478-pin package with Intel Netburst microarchitecture. The Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process utilizes Flip-Chip Pin Grid Array (FC-PGA2) package technology and plugs into a 478-pin surface mount, Zero Insertion Force (ZIF) socket, referred to as the mPGA478B socket. The Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process, like its predecessor, the Pentium 4 processor in the 478-pin package, is based on the same Intel 32-bit microarchitecture and maintains compatibility with IA-32 software.

The Intel NetBurst Micro-architecture features include hyper-pipelined technology, a rapid execution engine, a 400-MHz or a 533-MHz system bus, and an execution trace cache. The hyper-pipelined technology doubles the pipeline depth in the Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process, allowing the processor to reach much higher core frequencies. The rapid execution engine allows the two integer ALUs in the processor to run at twice the core frequency, enabling many integer instructions to execute in 1/2 clock tick. The 400-MHz or 533-MHz system bus is a quad-pumped bus running off a 100-MHz or 133-MHz system clock, making 3.2 Gigabyte/sec and 4.3 Gigabyte/sec data transfer rates possible. The execution trace cache is a first-level cache that stores decoded micro-operations, which removes the instruction decoding logic from the main execution path, thereby increasing performance.

Additional features within the Intel NetBurst Micro-architecture include:

- Advanced dynamic execution
- Advanced transfer cache
- Enhanced floating point and multimedia unit
- Streaming SIMD Extensions 2 (SSE2)

The advanced dynamic execution improves speculative execution and branch prediction internal to the processor. The advanced transfer cache is a 512 Kbyte, on-die level 2 (L2) cache. A floating point and multimedia unit has been implemented that provides superior performance for multimedia and mathematically intensive applications. Finally, SSE2 adds 144 new instructions for double-precision floating point, SIMD integer, and memory management. Power management capabilities such as AutoHALT, Stop-Grant, Sleep, and Deep Sleep have been retained.

The Streaming SIMD Extensions 2 (SSE2) enable breakthrough levels of performance in multimedia applications including 3D graphics, video decoding/encoding, and speech recognition. The new packed double-precision floating-point instructions enhance performance for applications that require greater range and precision, including scientific and engineering applications and advanced 3D geometry techniques, such as ray tracing.

Pentium 4 processor with 512 Kbytes L2 cache on 0.13 micron process Intel NetBurst microarchitecture system bus utilizes a split-transaction, deferred reply protocol like the Pentium 4 processor in the 478-pin package. This system bus is not compatible with the P6 processor family bus. The Intel NetBurst microarchitecture system bus uses Source-Synchronous Transfer (SST) of address and data to improve performance by transferring data four times per bus clock (4X data transfer rate, as in Accelerated Graphics Port [AGP] 4X). Along with the 4X data bus, the address bus can deliver addresses two times per clock and is referred to as a “double-clocked” or 2X address bus. Working together, the 4X data bus and 2X address bus provide a data bus bandwidth of up to 4.3 Gbytes/sec.

The processor system bus uses a variant of GTL+ signaling technology called Assisted Gunning Transceiver Logic (AGTL+) signal technology.

### 4.2.3 Intel® 852GME Chipset

The Intel 852GME Interactive Client Reference Design utilizes the Intel 852GME Chipset. The Intel 852GME Chipset, optimized for the Pentium 4 processor, features a 400/533 MHz system bus and up to 2 Gbytes of high-speed DDR 333/266 memory. The Intel 852GME Chipset delivers realistic 3D graphics with sharp images with Intel® Extreme Graphics 2 technology, enabling over 1 Gbyte/s of graphics bandwidth interface for high-quality 2D, 3D and video streams.

The Intel 852GME Chipset consists of two components: the Intel® 82852GME Memory Controller Hub (MCH) and the Intel® 82801DB I/O Controller Hub 4 (ICH4). These components are interconnected via an Intel proprietary interface called Hub Interface. Hub Interface 1.1 is designed into the Intel 852GME Chipset to provide efficient communication between these two components.

This Intel 852GME Chipset supports platform hardware features including:

- LVDS and Digital Video Output (DVO) video output
- DDR SDRAM system memory
- Ultra ATA/100
- Low Pin Count (LPC) interface
- Integrated LAN controller (requires additional PHY chip)
- Universal Serial Bus (USB) supporting both 2.0 and 1.1.

The platform is also Advanced Configuration Power Interface (ACPI) compliant and supports the following power management states:

- Full-on
- Stop grant
- Suspend to RAM
- Suspend to Disk
- Soft-off

## 4.2.4 Memory Controller Hub

The 852GME MCH component provides the processor interface, system memory interface, AGP interface, and hub interface to ICH4 in an Intel 852GME Chipset platform.

The MCH is in a 732-ball micro-FCBGA package and has the following functionality:

- Supports a single processor with a processor system bus speed of either 400 MHz or 533 MHz.
- Dual-independent display technology supporting LVDS, DVO, and VGA interfaces.
- Digital Video Interface (DVI) output is supported through the use of an external controller.
- Supports up to 2 Gbytes of DDR 333/266 SDRAM (in two unbuffered DIMMs), with or without ECC. More information is found in [Section 4.2.4.1](#) below.
- AGTL+ bus driver technology with integrated termination resistors supporting 32-bit host addressing.
- 8-bit, 266 Mbyte/s Hub Interface 1.1 to ICH4, operating at 1.5 V.

### 4.2.4.1 System Memory

- Supports one DDR-SDRAM channel, 64 bits wide (72 bits with ECC).
- Supports 333 MHz or 266 MHz DDR devices.
- Supports 64 Mbit, 128 Mbit, 256 Mbit and 512 Mbit technologies for x8 and x16 devices (no support for double sided x16 devices).
- Supports page sizes of 2 Kbytes, 4 Kbytes, 8 Kbytes and 16 Kbytes (must have four banks). Page size is individually selected for every row. Supports JEDEC DIMM configurations as defined in the JEDEC specification.

## 4.2.5 I/O Controller Hub

The ICH4 provides the I/O subsystem with access to the rest of the system and integrates many I/O functions.

### 4.2.5.1 Hub Interface to MCH

The Hub Interface (version 1.1) connects the 852GME MCH to the ICH4. All communication between the MCH and the ICH4 occurs over this interface. The 8-bit hub interface runs at 66 MHz quad-pumped for a bandwidth of 266 Mbytes/sec.

#### 4.2.5.2 Dual-Channel Ultra ATA-100 Bus Master IDE Controller

The ICH4 supports dual-channel Ultra ATA-100/66/33, Bus Master IDE and PIO modes and independent timing of up to four drives with separate IDE connections for primary and secondary cables. Additionally, “native mode” register and interrupt support is included.

#### 4.2.5.3 Six USB 2.0/1.1 Ports

The ICH4 contains three UHCI Host Controllers supporting six external USB 2.0/1.1 ports and an EHCI 2.0 Host Controller that supports all six ports. The Intel 852GME Interactive Client Reference Design board has four standard USB and two PoweredUSB\* ports, which are used to provide 12 V and 24 V power for peripherals requiring more power than a standard USB connector can provide.

#### 4.2.5.4 Advanced Configuration Power Interface

The ICH4 supports ACPI, which enables the OS to control the system’s power management. The ACPI spec supports six power modes, S0 (working), S1-S3 (sleep states), S4 (soft off), and S5 (mechanical off).

#### 4.2.5.5 System Management Bus 2.0 Controller

This controller integrates several functions designed to manage the system and lower the total cost of ownership (TCO) of the system. System management functions are designed to report errors, diagnose the system and recover from system lockups.

SMBus 2.0 provides an interface to manage peripherals such as Serial Presence Detection (SPD) on DIMMs. The SMBus has a 32-byte buffer, conducts hardware packet error checking and is compatible with most two-wire components that are also I<sup>2</sup>C compatible. A host interface allows the processor to communicate via SMBus, while a slave interface allows an external microcontroller to access system resources.

#### 4.2.5.6 Hardware Monitor

The Intel 852GME Interactive Client Reference Design utilizes the National\* LM85 hardware monitor, which monitors processor temperature, system voltages (2.5 V, 3.3 V, 5 V, 12 V), and three fan tachometers. The LM85 interfaces to the chipset via the SMBus.

#### 4.2.5.7 Firmware Hub

The reference board implements an Intel 82802AC FWH for its system BIOS storage. The 82802AC is a socketed, 8-Mbit, 32-pin PLCC device. All BIOS programming is controlled via software. The FWH resides on the LPC bus.

#### 4.2.5.8 PC I/O

The Intel 852GME Interactive Client Reference Design supports two Winbond\* I/O devices providing four serials ports, one parallel port, and PS/2 ports for mouse and keyboard, floppy drive interface, and IrDA.

#### 4.2.5.9 AC'97 2.3

This chipset supports 20-bit/16-bit audio capability with support for up to six channels of PCM audio output. In addition, its three codecs with independent PCI functions for audio and modem are supported. Microphone input and left and right audio channels are supported for a high quality two-speaker audio solution. The Intel 852GME Interactive Client Reference Design board has headers for line-out and analog CD-ROM input as well as three mini-jack connectors on the I/O panel for line-in, microphone, and headphone.

#### 4.2.5.10 PCI 2.2 Interface

The reference board supports three PCI slots for add-in devices (via riser). The PCI bus is compliant with the PCI Specification Rev. 2.2 for 32-bit data at 33 MHz, supporting 3.3 Vaux and PME# pins.

### 4.2.6 Networking

The Intel 852GME Interactive Client Reference Design supports three different Ethernet controllers utilizing a universal footprint:

- Intel® 82562EZ controller
- Intel® 82551QM controller
- Intel® 82540EM controller

### 4.2.7 Clocking

The CK-408 clock generator provides reference timing for the system; refer to the schematics for complete signaling details.

### 4.2.8 Real-Time Clock

An onboard battery maintains power to the real-time clock (RTC) when in a mechanical off state. A CR2032 battery is installed.

## 4.3 Power Supply

This system requires an ATX 12 V-compliant power supply. Be sure to connect the standard ATX power connector and the additional 12 V 4-pin connector to the system board before applying power.

## 4.4 Port 80h Checkpoint and Beep Codes

A checkpoint is either a byte or word value output to I/O port 80h. The BIOS outputs checkpoints throughout bootblock and Power-On Self Test (POST) to indicate the task the system is currently executing. Checkpoints are useful in aiding software developers or technicians in debugging

problems that occur during the pre-boot process. The BIOS uses beep codes to indicate a serious or fatal error occurring before the system video has been initialized. Beep codes are generated by the system board speaker, commonly referred to as the PC speaker.

Viewing checkpoints generated by the BIOS requires a checkpoint card, also referred to as a POST Card or POST Diagnostic Card. These are PCI add-in cards that show the value of I/O port 80h on an LED display. Checkpoint cards are available through a variety of computer mail-order outlets. These codes are valid for AMIBIOS8. For more information, refer to the AMI\* website at <http://www.ami.com>.

## 4.4.1 Bootblock Initialization Code Checkpoints

The Bootblock initialization code sets up the chipset, memory and other components before system memory is available. The following table describes checkpoints that can occur during the bootblock initialization portion of the BIOS

**Table 6. Bootblock Initialization Code Checkpoints**

Checkpoint	Description
Before D1	Early chipset initialization is done. Early Super I/O initialization is done, including RTC and keyboard controller. NMI is disabled.
D1	Perform keyboard controller BAT test. Check if waking up from power management suspend state. Save power-on CPUID value in scratch CMOS.
D0	Go to flat mode with 4Gbyte limit and GA20 enabled. Verify the bootblock checksum.
D2	Disable CACHE before memory detection. Execute full memory sizing module. Verify that flat mode is enabled.
D3	If memory sizing module not executed, start memory refresh and do memory sizing in Bootblock code. Do additional chipset initialization. Re-enable CACHE. Verify that flat mode is enabled.
D4	Test base 512Kbytes memory. Adjust policies and cache first 8Mbytes. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. Main BIOS checksum is tested. If BIOS recovery is necessary, control flows to checkpoint E0. See <a href="#">Section 4.4.2, "Bootblock Recovery Code Checkpoints" on page 24</a> for more information.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1 Mbyte read-write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel). See POST Code Checkpoints section of document for more information.
E1-E8, EC-EE	OEM memory detection/configuration error. This range is reserved for chipset vendors & system manufacturers. The error associated with this value may be different from one platform to the next.

## 4.4.2 Bootblock Recovery Code Checkpoints

The Bootblock recovery code gets control when the BIOS determines that a BIOS recovery must occur because the user has forced the update or the BIOS checksum is corrupt. The following table describes checkpoints that can occur during the Bootblock recovery portion of the BIOS.

**Table 7. Bootblock Recovery Code Checkpoints**

Checkpoint	Description
E0	Initialize the floppy controller in the Super I/O. Some interrupt vectors are initialized. DMA controller is initialized. 8259 interrupt controller is initialized. L1 cache is enabled.
E9	Set up floppy controller and data. Attempt to read from floppy.
EA	Enable ATAPI hardware. Attempt to read from ARMD and ATAPI CDROM.
EB	Disable ATAPI hardware. Jump back to checkpoint E9.
EF	Read error occurred on media. Jump back to checkpoint EB.
F0	Search for predefined recovery file name in root directory.
F1	Recovery file not found.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by the recovery file.
F3	Start reading the recovery file cluster by cluster.
F5	Disable L1 cache.
FA	Check the validity of the recovery file configuration to the current configuration of the flash part.
FB	Make flash write enabled through chipset and OEM specific method. Detect proper flash part. Verify that the found flash part size equals the recovery file size.
F4	The recovery file size does not equal the found flash part size.
FC	Erase the flash part.
FD	Program the flash part.
FF	The flash has been updated successfully. Make flash write disabled. Disable ATAPI hardware. Restore CPUID value back into register. Give control to F000 ROM at F000:FFF0h.

## 4.4.3 POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes checkpoints that can occur during the POST portion of the BIOS.

**Table 8. POST Code Checkpoints (Sheet 1 of 3)**

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialize CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.



Table 8. POST Code Checkpoints (Sheet 2 of 3)

Checkpoint	Description
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache - Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors
C6	Re-enable cache for boot strap processor
C7	Early CPU Init Exit
0A	Initializes the 8042 compatible keyboard controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of keyboard in KBC port.
0E	Testing and initialization of different input devices. Also, update the kernel variables. Traps the INT09h vector so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and silent logo modules.
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See DIM Code Checkpoints section of the BIOS specification for more information.
2C	Initializes different devices. Detects and initializes any installed video adapters that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM-specific information.
38	Initializes different devices through DIM. See DIM Code Checkpoints section of the BIOS specification for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, etc.) successfully installed in the system and update the BDA, EBDA, etc.
50	Program the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.

Table 8. POST Code Checkpoints (Sheet 3 of 3)

Checkpoint	Description
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed/requested.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPUs before boot, which includes programming the MTRRs.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).
61-70	OEM POST Error. This range is reserved for chipset vendors & system manufacturers. The error associated with this value may be different from one platform to the next.

## 4.4.4 Beep Codes

Beep codes are used by the BIOS to indicate a serious or fatal error and are generated by the system board speaker.

**Table 9. Beep Codes**

Number of Beeps	Description
1	Memory refresh timer error.
2	Parity error
3	Main memory read/write test error.
4	Motherboard timer not operational
5	Processor error
6	Keyboard controller BAT test error.
7	General exception error.
8	Display memory error.
9	ROM checksum error
10	CMOS shutdown register read/write error
11	Cache memory bad

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# Bill of Materials

# A

The following table provides the Bill of Materials (BOM) for the Intel® 852GME Interactive Client Reference Design.

**Table 10. Bill of Materials (Sheet 1 of 8)**

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B120015P	309	BC1, BC2, BC4, C10, C12, C14, C16, C26, C27, C28, C29, C30, C31, C35, C44, C45, C50, C52, C53, C54, C57, C58, C61, C62, C66, C70, C74, C75, C76, C79, C80, C88, C90, C92, C93, C95, C97, C100, C107, C110, C111, C112, C116, C117, C122, C128, C129, C130, C131, C140, C141, C151, C166, C169, C174, C179, C181, C182, C183, C190, C193, C196, C197, C203, C206, C212, C213, C214, C219, C229, C232, C233, C234, C236, C238, C240, C241, C242, C243, C244, C245, C249, C251, C252, C253, C254, C255, C256, C259, C260, C265, C268, C269, C270, C271, C288, C302, C306, C309, C311, C316, C526, C527, C528, C529, C530, C531, C533, C539, C547, C548, C549, C550, C551, C552, C553, C554, C555, C556, C557, C558, C559, C560, C561, C562, C563, C564, C565, C566, C567, C568, C569, C570, C571, C572, C573, C574, C575, C576, C577, C578, C579, C580, C581, C582, C583, C584, C585, C410, C414, C415, C418, C421, C422, C427, C428, C431, C442, C444, C445, C447, C448, C453, C455, C458, C459, C460, C461, C462, C463, C464, C465, C466, C467, C474, C475, C476, C477, C479, C480, C494, C497, C498, C500, C502, C509, C510, C514, C515, C518, C521, C522, C523, C524, C525, C586, C587, C588, C589, C590, C591, C592, C593, C594, C595, C596, C597, C598, C599, C600, C601, C602, C603, C604, C605, C606, C615, C616, C617, C619, C620, C623, C631, C632, C634, C636, C642, C648, C651, C653, C654, C655, C656, C657, C658, C659, C660, C661, C663, C667, C668, C317, C318, C319, C323, C324, C326, C328, C329, C331, C332, C333, C334, C335, C336, C341, C342, C346, C351, C352, C353, C355, C357, C358, C359, C362, C363, C364, C365, C367, C368, C369, C370, C371, C373, C378, C383, C385, C387, C388, C389, C390, C392, C398, C401, C403, C404, C409, C669, C670, C671, C673, C675, C676, C678, C685, C687, C691, C694, C695, C756, C757, C759, C773, C774, C775, C790, C791, C792	Chip Cap.	0.1UF 16 V 10% X7R 0603	TDK*	C1608 X7R 1C 104K
B1220130	67	BC5, C32, C33, C83, C91, C115, C150, C173, C191, C207, C208, C261, C262, C263, C264, C272, C273, C274, C279, C280, C281, C282, C283, C284, C285, C286, C312, C313, C314, C321, C322, C327, C344, C347, C348, C366, C379, C380, C381, C429, C433, C434, C435, C436, C437, C438, C439, C440, C450, C451, C454, C456, C469, C473, C483, C484, C487, C495, C513, C532, C543, C544, C637, C645, C646, C719, C772	Chip Cap	10UF 6.3 V 10% X5R 1206	TDK	C3216 X5R 0J 106K
B360000H	1	BT1	Battery	L1 Bat 3 V 220mA /HR	SONY*	CR2032
B365001H	1	BZ1	Audio Transducers	KC-1206-CU 5 V 12mm Rad Buzzer	HYCOM*	HY-05
B5041870	1	J29	Connector	Pin HDR 7 Px2-1(Pin 10) P=0.1" 0 DEG	TechBest*	PH207S-D10
B5040410	1	COM1	Connector	D-SUB 9 Px2 PC99, 30.81x19.75x31.47mm SPEC. Teal	FOXCONN*	DM10151-P72
B116001H	4	CP3, CP4, CP5, CP6	SMD Cap Array.	180PF 50 V 20% 8P4C	AVX*	W3A45A181KAT2A
B1160100	8	CP7, CP8, CP9, CP10, CP11, CP12, CP13, CP14	SMD Cap Array.	100PF 50 V 20% 8P4C	AVX	W3A45A101KAT2A

Table 10. Bill of Materials (Sheet 2 of 8)

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B120003R	33	C11, C34, C120, C121, C124, C132, C138, C145, C161, C162, C163, C176, C177, C223, C247, C307, C308, C337, C354, C361, C374, C408, C411, C416, C516, C517, C672, C689, C693, C755, C762, C763, C764	Chip Cap.	0.01UF 50V +/-10% X7R 0603	TDK	C1608 X7R 1H 103K
B120006R	2	C682, C19	Chip Cap.	180PF 50V +/- 5% NPO COG	TDK	C1608 COG 1H 181J
B120011T	5	C20, C21, C22, C23, C24	Chip Cap.	470PF 50V 5% NPO 0603	TDK	C1608 COG 1H 471J
B120002T	31	C25, C51, C78, C94, C108, C109, C113, C114, C123, C125, C134, C135, C136, C144, C147, C152, C156, C157, C164, C192, C194, C195, C199, C200, C202, C446, C478, C488, C501, C652, C688	Chip Cap.	1000PF 50V 5% NPO 0603	TDK	C1608 COG 1H 102J
B120032P	2	C5, C17	Chip Cap.	33PF 50V 5% NPO 0603	TDK	C1608 COG 1H 330J
B120008T	2	C47, C46	Chip Cap.	27PF 50V 5% NPO	TDK	C1608 COG 1H 270J
B120036P	6	C36, C37, C38, C67, C68, C69	Chip Cap.	3.3PF 50V 5% NPO 0603	TDK	C1608 COG 1H 3R3C
B1210320	11	EC2, EC3, C71, C72, C106, C142, C149, C760, C761, C788, C789	Chip Cap	4.7UF 6.3V 10% X5R 0805 CHIP	TDK	C2012 X5R 0J 475K
B1200600	30	C73, C98, C99, C101, C102, C103, C104, C105, C356, C372, C386, C402, C405, C407, C425, C441, C452, C481, C486, C490, C491, C493, C507, C614, C622, C624, C639, C786, C787, C796	Chip Cap	1UF 6.3V 10% X5R 0603	AVX	CM105X5R105K06AT
B120038P	2	C647, C84	Chip Cap.	4700PF 50V 10% X7R 0603	TDK	C1608 X7R 1H 472K
B120001T	4	C86, C399, C400, C417	Chip Cap.	100PF 50V 5% NPO 0603	TDK	C1608 COG 1H 101J
B1220140	4	C118, C211, C684, C715	Chip Cap	4.7UF 16V +/-15% X5R 1206 CHIP	TDK	C3216 X5R 1C 475K
B1210310	9	C137, C139, C154, C155, C178, C216, C227, C305, C717	Chip Cap	1UF 16V 10% X5R 0805	AVX	CM21X5R105K16AT
B120025P	2	C201, C168	Chip Cap.	22PF 50V 5% NPO 0603	TDK	C1608 COG 1H 220J
B1220120	3	C170, C171, C239	Chip Cap	2.2UF 16V 10% X5R 1206	AVX	CM316X5R225K16AT
B1240020	8	C172, C226, C303, C310, C419, C420, C449, C499	Chip Cap	10UF 10V 10% X5R 1210 CHIP	AVX	CM32X5R106K10AT
B121008P	17	C224, C237, C250, C266, C339, C343, C350, C360, C377, C384, C397, C482, C537, C621, C644, C679, C690	Chip Cap.	1UF 10V 10% X7R 0805	TDK	0805 105K X7R 16V
B120022P	2	C635, C640	Chip Cap.	18PF 50V 5% NPO 0603	TDK	C1608 COG 1H 180J
B120050T	1	C290	Chip Cap.	5600PF 50V 10% 0603 X7R	TDK	C1608 X7R 1H 562K
B120000T	2	C277, C338	Chip Cap.	10PF 50V 5% NPO 0603	TDK	C1608 COG 1H 101J
B120007R	1	C345	Chip Cap.	220PF 50V +/-5% COG	TDK Manufacturer 2: ROHM*	C1608 COG 1H 221J Manufacturer 2: MCH185A221JK
B088046Y	28	R111, R116, R125, R129, R242, R243, R245, R246, R247, R248, R249, R250, R251, R252, R276, R305, R306, R314, R315, R316, R323, R355, C406, R533, R534, R559, R667, R668	Chip Resistor	33 ohm 1/10W 5% 0603	YAGEO*	RC0603JR-0733R
B120039P	1	C506	Chip Cap.	0.047UF 16V 10% X7R 0603	TDK	C1608 X7R 1H 473K 50V
B120018P	1	C650	Chip Cap.	12PF 50V 5% NPO 0603	TDK	C1608 COG 1H 120J
B1240030	3	C713, C714, C799	Chip Cap	10UF 25V +/-20% X5R 1210 CHIP	AVX	CT32X5R106K25AT
B650008A	2	DIMM2, DIMM1	DIMM SOCKET	DDR-DIMM Socket 184P 2.5V (15U)	AMP	390241-1
B207003X	6	D1, D6, D7, D8, D28, D29	SMD Diode.	1N4148 Round TE-11	ROHM	1N4148
B270000X	7	D2, D3, D4, D5, D10, D11, D12	SMD Diode	BAT54S SCHOTTKY SOT-23	Philips*	
B207006X	3	D19, D21, D23	SMD Diode.	1N5820 RB050L-40	ROHM	RB050L-40
B259007X	10	D13, D14, D15, D16, D20, D22, D32, D37, D38, D39	SMD DIODE	RB751V-40 SCHOTTKY SC-76	ROHM	RB751V-40
B207004X	5	D9, D24, D27, D30, D31	SMD Diode.	1N5817 RB160L-40	ROHM	RB160L-40

**Table 10. Bill of Materials (Sheet 3 of 8)**

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B1000680	6	EC4, EC5, EC8, EC9, EC24, EC35	Aluminum Elec. Cap	470UF 16V 8x11.5	NCC	EEUFJ1C471U
B1000370	24	EC34, EC36, EC52, EC58, EC46, EC44, EC43, EC54, EC64, EC65, EC45, EC66, EC72, EC67, EC75, EC7, EC11, EC76, EC55, EC21, EC50, EC63, EC68, EC77	Aluminum Elec. Cap	220UF 10V DIP 20% 6x11	NCC Manufacturer 2: QingYi Tech	KY10VB220M Manufacturer 2: 6.3YXA220MTA6.3*11
B1000080	3	EC14, EC15, EC19	Aluminum Elec. Cap	1800uF/ 16V 10x25 RADIAL	NCC	KZG16VB1800MJ25
B100015T	2	EC17, EC16	Aluminum Elec. Cap	Cap. 100UF 16V/25V 105 degree 20% Radial EL 6.3x11mm	NCC	KMF-025VB100
B131005P	4	EC22, EC23, EC49, EC61	SMD Cap Aluminum.	22UF 6.3V VHB 105 B-Size EL	Panasonic	EEVHB0J220R
B1000290	9	EC25, EC26, EC27, EC28, EC29, EC30, EC31, EC32, EC33	Aluminum Elec. Cap	1500uF, 2.5V, DIP, 20% 10x12.5	NCC	2R5PS1500MJ12
B1150210	2	EC37, EC38	KO-CAP	470UF 4V Size: D	KEMET	T520D477M004AS
B130001K	2	EC42, EC39	SMD Tantalum Cap.	47U/6.3V T520 3528 SMD	KEMET	T520B476M006AS
B100025P	4	EC41, EC56, EC73, EC83	Aluminum Elec. Cap	1000UF 6.3V 8x11.5	NCC	EEUFJ0J102UY
B131024P	2	EC62, EC47	SMD Cap Aluminum.	47UF 6.3V 20% 85 degree C-Size	Panasonic	ECEV0JA470SR
B1150190	1	EC48	KO-CAP	220UF 4V Size: V	KEMET	T520V227M004AS
B100007R	2	EC71, EC80	Aluminum Elec. Cap	1500UF 10V 10x16 A-FJ	Matsushita	EEUFJ1A152
B100011P	1	EC78	Aluminum Elec. Cap	2200UF 6.3V 10x16 A-FJ Radial	Panasonic	EEUFJOJ222U
B479033M	48	FB1, FB3, FB4, FB5, FB6, FB7, FB8, FB9, FB10, FB11, FB12, FB13, FB14, FB15, FB16, FB18, FB19, FB20, FB21, FB22, FB23, FB24, FB25, FB26, FB27, FB36, FB37, FB38, FB39, FB40, FB41, FB42, FB43, FB44, FB45, FB46, FB47, FB48, FB49, FB51, FB52, FB55, FB56, FB57, FB58, FB59, FB60, FB61	SMD Ferrite Bead	30 ohm 2012 3A	muRata	BLM21P300SPT
B4920040	1	FB17	SMD Ferrite Bead	150 ohm 2012 3A	FORMOSA	CBH201209U151
B4920100	3	FB28, FB29, FB30	SMD Ferrite Bead	80ohm 0805 2A.	G	GBD-201209GH800N
B093000Y	34	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R17, R19, R20, R22, R23, R24, R26, FB31, FB32, FB33, FB34, FB 35, R47, R482, R483, R560, R641, R680, R683, R686, R701	Chip Resistor	0 ohm 1/8W 5% 0805	YAGEO	RC0805JR-070R
B4920050	4	FB50, FB53, FB54, FB62	SMD Ferrite Bead	300 ohm 2012 3A	FORMOSA	CBH201209U301
B498006B	4	FS2, FS3, FS6, FS7	SMD Fuse	2.5A 15V PolySwitch	Raychem	SMD250-2
B498007R	1	FS5	SMD Fuse	1.1A 1812 SMD	Raychem	P110TS/TG
B498016R	5	FS4, FS8, FS9, FS10, FS11	SMD Fuse	1.6A 1812 TG	Polytronics	SMD1812P160TS
B498008R	1	F1	SMD Fuse	750mA/6V Poly Switch 1206	Raychem	nanosMDM 075-2
B8300240	1	HS1	Heat sink	MCH Purple heat sink w/ Portwell logo	ShiYi	
B504009G	5	JP1 (Pin2-3), JP2 (Pin2-3), JP3 (Pin2-3), JP4 (Pin2-3), JP5 (Pin1-2)	Connector	Jumper Shunt FM 2P RED Open 0.1"	GINGYANG	MJ-8.0-B
B5040710	1	J1	Connector	@3.5 Triple Jack 21.60x12.6x38.5mm Thermoplastic & Brass, Pink/Light Blue/Lime	Foxconn	JA33331-G06
B5040300	1	J2	DVI-I Connector	36.82x17.46x10.04mm Thermoplastic & Brass, Ivory	Foxconn	QH11121-EP0
B5047090	1	J3	Connector.	D-SUB 15P 31.01x8.30x12.42mm THIN Thermoplastic & Brass, Blue.	Foxconn	DZ11AA1-P8
B5041270	2	J5, J4	PowerUSB Connector	13.8x16.4x13.5mm Thermoplastic & Brass, TEAL	FCI	55917-101

Table 10. Bill of Materials (Sheet 4 of 8)

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B5040100	1	J6	Connector	MINI DIN 6Px2 19.8x14.0x28.24mm w/o leaf spring PC99 SPEC. Green/Purple	Foxconn	MH11061-PD2
B5043080	1	J7	Connector	D-SUB 25P 53.42x17.83x31.60mm High Rise, Thermoplastic & Brass, Burgundy	Foxconn	DM11351-PR3
B5040150	1	J8	Connector.	RJ45 w/x'fmr w/LED Brass 25.4x16.8x13.49	SpeedTech	P62-1D3-1AX9
B5041860	1	J9	Connector	Pin HDR 7Px2-1(Pin 8) P=0.1" 0 DEG	TechBest	PH207S-D8
B504208M	2	J11, J10	Connector	SHR HDR MA 5Px2 P=0.1"	AMCO	200-10SG1BA
B504148R	3	J12, J18, J21	Connector	HDR W/WAFER MA 3P P=0.1"	CHERNG-WEEI	W/F 2.54-180-3P
B5046240	1	J13	Connector	SHR HDR 12V CONN. MA 2Px2	TechBest	1613-810-04S
B650030M	1	J14	Connector	HDR 70543 MA 4Px1 P=0.1"	MOLEX	70543-0003
B504018M	1	J15	Connector	PCI Slot 10u 120P	Molex	892-59-6021
B5040090	1	J16	PCI Connector	22Pin 19.81x8.85x15.49mm Thermoplastic & Brass, White	Foxconn	EH01111-GL-V
B6210050	1	J17	SMD Connector	Pin HDR MA 7Pin 1.25" wire to board	Molex	53261-0790
B5041880	1	J20	Connector	Pin HDR 5Px2-1(Pin 9) P=0.1" 0 DEG	TechBest	PH205S-D9
B5047100	1	J22	Connector.	Pin HDR MA 6Px2-1 P=0.1".Cut pin12	TechBest	PH206S-D12
B504217M	2	J24, J26	Connector	SHR HDR MA 20Px2-1KEY 0.1"	AMCO	200-B0201-006
B5041890	1	J25	Connector	Pin HDR 3Px2-1(Pin 2) P=0.1" 0 DEG	TechBest	PH203S-D2
B5040190	1	J27	Connector	Box Header 17Px2 -1 (Pin 5) P=0.1" 180D Black	TechBest	1131-A031-34-5
B5040110	1	J28	Connector	Pin Header 13Px2 2mm, Thermoplastic & Brass Black	TechBest	PH1-213-211
B5047070	1	J30	Connector	2.0mm Wafer, 180 degree, 3Px2 Nylon 66/White 7.9x5.0x9.6mm	TechBest	1049061001
B504034A	1	J31	Connector	USB Shield Receptacle 12P8C	Foxconn	UB1112C-8D1
B5047080	1	LVDS1	Box Header	2x25 180 degree 2.0mm.PBT/Black	HuanTa Manufacturer 2: TechBest	BH-2S-50-GOB Manufacturer 2: BH20-225S-MLX
B0870280	2	LVDS1, Pin 7-Pin 43, Pin 8-Pin 44	CF Resistor DIP	2.2K ohm CF 1/4W 5% AXIAL		
B4800580	4	L1, L2, L3, L4	Inductors.	Toroidal Coil 0.8UH +/-20% 1.0mm.CORE:T5008B cai. External diameter16.5+/-2.0mm.	TRIO	TCU-5008B-R80M100BPM
B479003F	2	L6, L5	Chip Inductor	4.7UH 10% 2012	HongLing Manufacturer 2: FORMOSA	MLF2012A4R7K Manufacturer 2: CL201212-4R7K
B9750020	2	L8, L7	Chip Inductor	0.1UH 5% 400MA 0805	3L	SMDCHGR0805-R10J
B4790530	2	L9, L14	Chip Inductor	Coil 3.3UH 20% SMD 3R3M	FORMOSA	DS3316F-3R3
B4790610	1	L10	SMD Ferrite Bead	0.68UH 10% 2012	FORMOSA	CL201209-R68K
B479000E	1	L11	Chip Inductor	1UH 10% 2012	FORMOSA	CL 201209-1ROK
B4800570	1	L12	Inductors	Coil 3.1UH 15% 0.7mm single-wire entwined.CORE:44-08 cai	FORMOSA	PC4408-090112V-3R0M+UL
B4800560	1	L13	Inductors	Coil 1.1UH 15% 0.6mm three-wire entwined.CORE:44-08 cai	FORMOSA	PC4408-060307V-1R1M+UL
B504055A	1	PW1	Connector	ATX Power 20Pin	AMCO	210-20YTINA
B258000T	1	Q1	SMD IC	100MA SO- 8P TO-92 SMD 3-Terminal Positive Regulator	N.S	LM78L05ACMX
B273000X	20	Q2, Q5, Q6, Q19, Q20, Q25, Q27, Q28, Q31, Q32, Q34, Q36, Q41, Q46, Q47, Q48, Q49, Q57, Q58, Q59	SMD Silicon NPN Transistor	3904 NPN SOT-23	Infineon	2N3904/SMBT3904



**Table 10. Bill of Materials (Sheet 5 of 8)**

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B259027X	13	Q3, Q4, Q7, Q10, Q21, Q24, Q30, Q39, Q40, Q42, Q44, Q56, Q60	Transistor.	MOSFET SOT-23 N-Channel	ON Manufacturer 2: SamHop	2N7002LT1 Manufacturer 2: SM2N7002-S72
B2750060	4	Q8, Q9, Q11, Q37	SMD FET	TR MOSFET TO-263 SMD	Intersil	ISL9N306AS3ST
B274002X	1	Q12	SMD Silicon PNP Transistors	2N3906 PNP SOT-23	ON	MMBT3906LT1
B2750050	3	Q13, Q14, Q16	SMD FET	TR MOSFET TO-263 SMD	Fairchild	FDB6035AL
B2810010	2	Q29, Q22	SMD Analog IC	SOT23 Zener Regulator	N.S	LM431BCM3
B2810040	2	Q33, Q35	SMD Analog IC	LDO TO-263	Fairchild	FAN1084MCX
B280121N	1	Q26	SMD Digital IC	SOT-223 3.3V 4P 2500/RELL Regulator	Fairchild	RC1117S33T
B259019X	2	Q38, Q45	Transistor.	MOSFET TO-252AA	Fairchild	FDD6030L
B041017Y	3	RN1, RN3, RN7	Thick Film Resistor	RN 33 ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B041016Y	4	RN8, RN65, RN68, RN69	Thick Film Resistor	RN 2.7K ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B0410590	1	RN10	Thick Film Resistor	RN 100 ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B041023Y	1	RN11	Thick Film Resistor	RN 4.7K ohm 8P4R 1/16W 5%	YAGEO	YAGEO
B041028Y	4	RN12, RN13, RN14, RN64	Thick Film Resistor	RN 8.2K ohm 8P4R 1/16W 5%	YAGEO	YAGEO
B041006Y	1	RN15	Thick Film Resistor	RN 1K ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B041005Y	18	RN16, RN17, RN18, RN19, RN20, RN21, RN22, RN23, RN24, RN25, RN26, RN27, RN28, RN29, RN30, RN31, RN32, RN33	Thick Film Resistor	RN 10 ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B041025Y	30	RN34, RN35, RN36, RN37, RN38, RN39, RN40, RN41, RN42, RN43, RN44, RN45, RN46, RN47, RN48, RN49, RN50, RN51, RN52, RN53, RN54, RN55, RN56, RN57, RN58, RN59, RN60, RN61, RN62, RN63, R373, R493, R494, R623, R626	Thick Film Resistor	RN 56 ohm 8P4R 1/16W 5% YCN16	YAGEO	YAGEO
B089005Y	38	R15, R16, R30, R31, R82, R104, R112, R114, R118, R132, R138, R146, R147, R149, R151, R152, R332, R338, R398, R339, R459, R487, R514, R571, R573, R604, R605, R620, R281, R282, R313, R584, R585, R586, R626, R659, R647, R655	Chip Resistor	1K ohm 1/10W 5% 0603	YAGEO	YAGEO
B089034Y	12	R25, R65, R91, R124, R126, R165, R342, R346, R610, R611, R648, R649	Chip Resistor	2.2K ohm 1/10W 5% 0603	YAGEO	YAGEO
B089071Y	1	R590	Chip Resistor	470K ohm 1/10W 5% 0603	YAGEO	YAGEO
B089043Y	3	R28, R34, R98	Chip Resistor	27K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0727K
B089053Y	3	R29, R405, R669	Chip Resistor	33K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0733K
B089006Y	43	R32, R33, R45, R46, R69, R94, R131, R139, R164, R178, R179, R195, R219, R232, R236, R241, R270, R303, R333, R340, R378, R404, R416, R453, R474, R475, R499, R501, R507, R516, R517, R531, R538, R539, R556, R587, R588, R601, R618, R621, R682, R685, R688	Chip Resistor	10K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0710K
B089000Y	71	R100 R105 R133 R136 R140 R166 R168 R174 R182 R196 R197 R213 R240 R261 R369 R383 R387 R458 R465 R467 R468 R469 R471 R472 R473 R477 R478 R479 R486 R511 R566 R572 R592 R593 R603 R624 R630 R631 R632 R633 R634 R635 R581 R582 R583 R651 R661 R662 R665 R666 R677 R690 R691 R692 R695 R696 R703 R705 R707 R724 R726	Chip Resistor	0 ohm 1/10W 5% 0603	YAGEO	RC0603JR-070R
B088047Y	3	R37,R43,R580	Chip Resistor	330 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07330R
B088131Y	17	R38, R51, R76, R96, R287, R291, R326, R334, R335, R336, R337, R348, R350, R361, R363, R418, R419	Chip Resistor	49.9 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0749R9

Table 10. Bill of Materials (Sheet 6 of 8)

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B088062Y	2	R39, R52	Chip Resistor	56 ohm 1/10W 1% 0603	YAGEO	RC0603FR-56R
B088143Y	1	R49	Chip Resistor	619 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07619R
B088136Y	1	R50	Chip Resistor	549 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07549R
B089052Y	4	R103, R123, R407, R417	Chip Resistor	3.3K ohm 1/10W 5% 0603	YAGEO	RC0603JR-073R3
B0880080	1	R64	Chip Resistor	715 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07715R
B089069Y	35	R70, R71, R81, R88, R97, R99, R109, R121, R122, R127, R128, R181, R203, R209, R210, R227, R228, R259, R280, R297, R299, R381, R386, R393, R410, R476, R502, R503, R510, R535, R553, R563, R599, R600, R629	Chip Resistor	4.7K ohm 1/10W 5% 0603	YAGEO	RC0603JR-074R7
B088070Y	4	R73, R74, R75, R368	Chip Resistor	75 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0775R
B089070Y	3	R77, R110, R606	Chip Resistor	47K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0747K
B089007Y	11	R83, R84, R85, R86, R87, R269, R344, R351, R374, R409, R546	Chip Resistor	100K ohm 1/10W 5% 0603	YAGEO	RC0603JR-07100K
B089068Y	2	R504, R537	Chip Resistor	470 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07470R
B088003Y	8	R102, R162, R163, R237, R238, R310, R325, R532	Chip Resistor	1K ohm 1/10W 1% 0603	YAGEO	RC0603FR-071K
B088058Y	1	R107	Chip Resistor	510 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07510R
B0882270	1	R119	Chip Resistor	390 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07391R
B0880340	1	R120	Chip Resistor	240 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07240R
B088128Y	1	R130	Chip Resistor	4.99K ohm 1/10W 1% 0603	YAGEO	RC0603FR-074K99
B089008Y	1	R135	Chip Resistor	1M ohm 1/10W 5% 0603	YAGEO	RC0603JR-071M
B0940000	3	R137, R156, R191	Chip Resistor	4.7 ohm 1/10W 5% 0805	YAGEO	RC0805JR-074R7
B089060Y	3	R154, R157, R176	Chip Resistor	3.9K ohm 1/10W 5% 0603	YAGEO	RC0603JR-073K9
B089037Y	6	R155, R158, R192, R613, R615, R617	Chip Resistor	2.2 ohm 1/10W 5% 0603	YAGEO	RC0603JR-072R2
B089098Y	26	R207, R208, R302, R364, R463, R466, R470, R519, R523, R524, R526, R527, R536, R540, R551, R554, R555, R557, R575, R576, R577, R578, R628, R658, R663, R664	Chip Resistor	8.2K ohm 1/10W 5% 0603	YAGEO	RC0603JR-078K2
B089046Y	6	R190, R194, R265, R267, R275, R377	Chip Resistor	300 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07300R
B088004Y	2	R201, R283	Chip Resistor	10K ohm 1/10W 1% 0603	YAGEO	RC0603FR-0710K
B088040Y	2	R278, R204	Chip Resistor	28K ohm 1/10W 1% 0603	YAGEO	RC0603FR-0728K
B088099Y	1	R205	Chip Resistor	232K ohm 1/10W 1% 0603	YAGEO	RC0603FR-07232K
B088064Y	1	R206	Chip Resistor	56K ohm 1/10W 1% 0603	YAGEO	RC0603FR-0756K
B089073Y	11	R211, R215, R216, R221, R222, R234, R253, R256, R263, R266, R277	Chip Resistor	51 ohm 1/10W 5% 0603	YAGEO	RC0603JR-0751R
B089033Y	2	R220, R329	Chip Resistor	220 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07220R
B088021Y	1	R223	Chip Resistor	15K ohm 1/10W 1% 0603	YAGEO	RC0603FR-0715K
B093011Y	1	R226	Chip Resistor	220 ohm 1/8W 5% 0805	YAGEO	RC0805JR-07220R
B089017Y	2	R229, R322	Chip Resistor	1.5K ohm 1/10W 5% 0603	YAGEO	RC0603JR-071K5
B0940020	3	R230, R231, R392	Chip Resistor	1 ohm 1/10W 5% 0805	YAGEO	RC0805JR-071R
B0882100	1	R239	Chip Resistor	1.05K ohm 1/10W 1% 0603	YAGEO	RC0603FR-071K05
B089016Y	4	R254, R352, R542, R574	Chip Resistor	150 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07150R
B088020Y	1	R271	Chip Resistor	1.5K ohm 1/10W 1% 0603	YAGEO	RC0603FR-071K5
B088107Y	2	R272, R301	Chip Resistor	301 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07301R
B088019Y	6	R273, R312, R394, R396, R455, R457	Chip Resistor	150 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07150R
B088194Y	5	R274, R311, R349, R354, R371	Chip Resistor	27.4 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0727R4
B0880810	1	R285	Chip Resistor	127 ohm 1/8W 1% 0603	YAGEO	RC0603FR-07127R 1/10W
B093002Y	3	R294, R569, R719	Chip Resistor	100 ohm 1/8W 5% 0805	YAGEO	RC0805JR-07100R

**Table 10. Bill of Materials (Sheet 7 of 8)**

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B088119Y	1	R295	Chip Resistor	40.2 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0740R2
B088002Y	8	R300, R347, R353, R358, R366, R389, R403, R408	Chip Resistor	100 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07100R
B088179Y	1	R317	Chip Resistor	475 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07475R
B089058Y	3	R345, R56, R57	Chip Resistor	39 ohm 1/10W 5% 0603	YAGEO	RC0603JR-0739R
B089087Y	1	R367	Chip Resistor	680 ohm 1/10W 5% 0603	YAGEO	RC0603JR-07680R
B0891080	3	R370, R415, R480	Chip Resistor	62 ohm 1/10W 5% 0603	YAGEO	RC0603JR-0762R
B0882060	1	R402	Chip Resistor	22 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0722R
B088142Y	2	R375, R379	Chip Resistor	60.4 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0760R4
B0880341	1	R382	Chip Resistor	243 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07243R
B0882330	2	R397, R395	Chip Resistor	604 ohm 1/10W 1% 1608 (0603)	YAGEO	
B089029Y	2	R399, R518	Chip Resistor	200K ohm 1/10W 5% 0603	YAGEO	RC0603JR-07200K
B0930320	2	R401, R509	Chip Resistor	5.1 ohm 1/8W 5% 0805	YAGEO	RC0805JR-075R1
B0882090	1	R411	Chip Resistor	169 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07169R
B089003Y	18	R420, R421, R422, R423, R424, R425, R432, R433, R435, R436, R439, R440, R445, R446, R447, R448, R449, R450	Chip Resistor	10 ohm 1/10W 5% 0603	YAGEO	RC0603JR-0710R
B089035Y	3	R541, R558, R567	Chip Resistor	22K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0722K
B0880070	1	R454	Chip Resistor	487 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07487R
B088012Y	1	R456	Chip Resistor	130 ohm 1/10W 1% 0603	YAGEO	RC0603FR-07130R
B0880310	1	R460	Chip Resistor	22.6 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0722R6
B0882030	1	R464	Chip Resistor	68.1 ohm 1/10W 1% 0603	YAGEO	RC0603FR-0768R1
B089023Y	5	R101, R260, R406, R412, R492	Chip Resistor	1.8K ohm 1/10W 5% 0603	YAGEO	RC0603JR-071K8
B089042Y	7	R505, R508, R530, R656, R657, R720, R721	Chip Resistor	2.7K ohm 1/10W 5% 0603	YAGEO	RC0603JR-072K7
B089009Y	2	R496, R498	Chip Resistor	10M ohm 1/10W 5% 0603	YAGEO	RC0603JR-0710M
B089028Y	1	R512	Chip Resistor	20K ohm 1/10W 5% 0603	YAGEO	RC0603JR-0720K
B088044Y	1	R515	Chip Resistor	30K ohm 1/10W 1% 0603	YAGEO	RC0603FR-0730K
B089001Y	1	R543	Chip Resistor	1 ohm 1/10W 5% 0603	YAGEO	RC0603JR-071R
B0882110	1	R544	Chip Resistor	2.15K ohm 1/10W 1% 0603	YAGEO	RC0603FR-072K15
B093017Y	5	R547, R548, R549, R550, R570	Chip Resistor	330 ohm 1/8W 5% 0805	YAGEO	RC0805JR-07330R
B0970130	1	R564	Chip Resistor	68 ohm 1/4W 5% (3216)1206	YAGEO	RC1206JR-0768R
B089019Y	2	R452, R595	Chip Resistor	150K ohm 1/10W 5% 0603	YAGEO	RC0603JR-07150K
B089047Y	1	R591	Chip Resistor	3K ohm 1/10W 5% 0603	YAGEO	RC0603JR-073K
B088027Y	1	R594	Chip Resistor	2K ohm 1/10W 1% 0603	YAGEO	RC0603FR-072K
B089081Y	1	R602	Chip Resistor	5.6K ohm 1/10W 5% 0603	YAGEO	RC0603JR-075K6
B088054Y	3	R612, R614, R616	Chip Resistor	4.7 ohm 1/10W 1% 0603	YAGEO	RC0603FR-074R7
B089088Y	1	R619	Chip Resistor	6.8K ohm 1/10W 5% 0603	YAGEO	RC0603JR-076K8
B3240000	4	SA1, SA2, SA3, SA4		Fixture For Heat Sink	ChiHong	50209044
B280071R	4	U1, U2, U5, U6	SMD Digital IC	IC RS-232 SSOP 28P	A/D Manufacturer 2: Intersil	ADM213EARS Manufacturer 2: HIN213EIA
B2800020	1	U4	Digital IC.	DIP 6W Amplifier	Phillips	TDA1517P
B2801840	1	U7	SMD Digital IC.	GD82562EX LOM	Intel	GD82562EX
B2810050	1	U8	SMD Analog IC	IC AC'97 COD.TQFP 48P	Realtek	ALC201A
B2803320	1	U9	SMD Digital IC	Panel Link Transmitter 164 TQFP 64P LCD	SII	164CT64

Table 10. Bill of Materials (Sheet 8 of 8)

Component	Qty	Reference	Type	Description	Mfg	Mfg Part #
B280083N	1	U10	SMD Digital IC	IC SOP 8P Regulator	N.S	LM317LM
B280283H	3	U11, U12, U15	SMD Digital IC	PWM SOIC 8P	HARRIS	HIP6601
B284013N	1	U29	SMD Memory (Blank)	IC EEPROM 1K-Bit SOIC 8P	Catalyst	CAT93C46S-26490T (G Version)
B280222W	2	U17, U14	SMD Digital IC	LPC SUPER I/O PQFP, MIDI port	WINBOND	W83627HF-AW
B2800050	1	U16	SMD IC	Optimized Multi-phase PWM controller 28PIN SOIC Black	Intersil	ISL6556BCB
B280245N	1	U18	SMD Digital IC	IC OPA 14P	N.S	LM324MX
B2803850	1	U19	SMD Digital IC	IC SSOP 56P CLOCK	ICS	ICS950201AF
B622000A	1	U20	SMD Socket IC	IC Socket BGA	AMP	1-1364990-3
B263003D	1	U21	Digital IC.	SOIC 8P CLK BUF.	ICS	ICS9112-16
B650019N	1	U23	IC SOCKET	IC SOCKET PLCC, 32P, SMD	NELTRON	6601-32-01
B2800060	1	U24	SMD IC	IC Intel GMCH	Intel	82852GME
B3730000	1	U25	SMD IC	Hardware Sensor 24Pin QSOP	N.S	LM85BIMQ
B2803830	2	U27, U32	SMD Digital IC	IC Switch Regulator SSOP 16P	YongYei	CM8500
B2803940	1	U30	SMD Digital IC	IC Intel® 82801DB I/O Controller Hub 4 (ICH4)	Intel	82801DB
B280148I	1	U31	SMD Linear IC	Switching PWM SOIC 8P	Intersil	ISL6520ACB
B2803801	2	U35, U33	SMD Digital IC	TSSOP-5 SOT-353	Philips	74AHCT1G08GW
B2804130	1	U34	SMD Digital IC	LOGIC SO-8	Philips	74CBT3306D
B326015F	1	X1	Crystal	25Mhz HC49/U-S DIP 50PPM	Citizen	ARGO081704HC-49S
B326014F	1	X2	Crystal	AT-24.576 Mhz 49/US 20/30	Citizen	ARGO082001
B327017E	1	X3	SMD Crystal	32.768Khz 4P SMD	Epson	
B325001E	1	Y1	Crystal	14.31818Mhz 16pF+-30ppm HC49/U-S Fundamental	FUJII Manufacturer 2: Citizen	HC-49/US Manufacturer 2: Low Profile Type HC-49US
B041013Y	10	RN2, RN4, RN5, RN6, RN70, RN71, RN72, RN73, RN74, RN75	Thick Film Resistor	RN 2.2K ohm 8P4R 1/16W 5% YCN16	YAGEO	YCJR-072R2K
B088081Y	1	R365	Chip Resistor	124 ohm 1/10W 1% 0603	YAGEO	RC-0603FR-07124R
B0882080	2	R284, R328	Chip Resistor	51.1 ohm 1/10W 1% 0603	YAGEO	RC-0603FR-0751R1
B089014Y		R376	Chip Resistor	1.3K ohm 1/10W 5% 0603	YAGEO	RC-0603JR-071R3K
B089018Y	3	R27, R35, R93	Chip Resistor	15K ohm 1/10W 5% 0603	YAGEO	RC-0603JR-0715K
B089030Y	2	R642, R643	Chip Resistor	2M ohm 1/10W 5% 0603	YAGEO	RC-0603JR-072M
B089049Y	6	R286, R290, R318, R319, R320, R321	Chip Resistor	33 ohm 1/10W 1% 0603	YAGEO	RC-0603FR-0733R
B089054Y	1	R414	Chip Resistor	330K ohm 1/10W 5% 0603	YAGEO	RC-0603JR-07330K
B093013Y	1	R652	Chip Resistor	270 ohm 1/8W 5% 0805	YAGEO	RC-0805JR-07270R
B1210350	1	C613	Chip Cap	2.2UF 10V X5R 0805	AVX	CM21X5R225K10AT
B2740050	6	Q50, Q51, Q52, Q53, Q54, Q55	SMD Silicon PNP Transistor	SOT-23	Philips	PMBT2907A
B089004Y	6	R597, R598, R672, R673, R713, R714	Chip Resistor	100 ohm 1/10W 5% 0603	YAGEO	PMBT2907A
B093003Y	1	R495	Chip Resistor	1K ohm 1/8W 5% 0805	Yacon	RC-05RJ-1K
B504099T	1	J32	Connector	Pin HDR MA 4Px2 P=2mm 180_		



## ***Schematics***

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***B***

This section provides schematics for the Intel® 852GME Interactive Client Reference Design.

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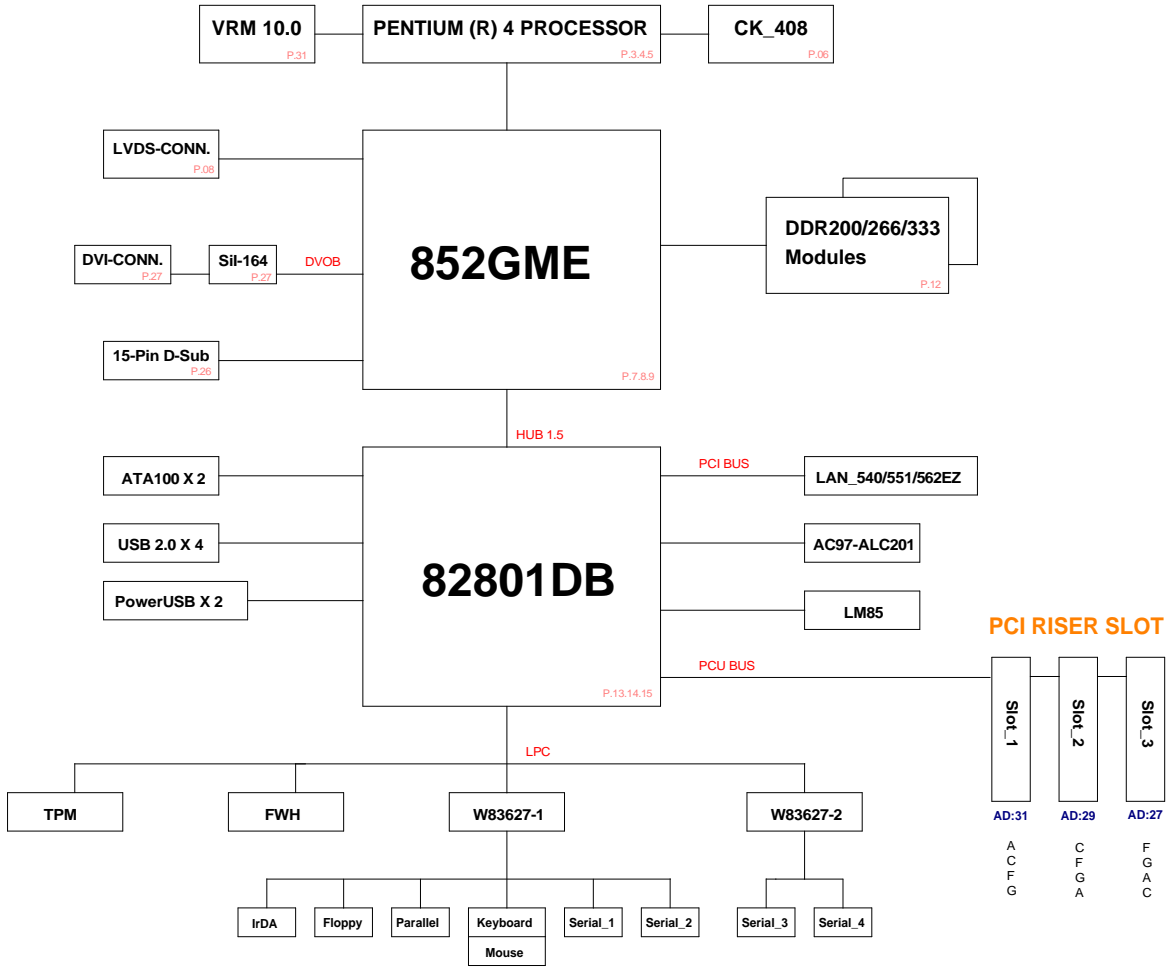
# PEB-7710VLA-R2

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<p>Naming Rule for Part Value :</p> <table> <tr> <td>/6 0603 Package size</td> <td>/1 1% resistor</td> </tr> <tr> <td>/8 0805 Package size</td> <td>/X Not stuffed</td> </tr> <tr> <td>/10 1210 Package size</td> <td></td> </tr> <tr> <td>/12 1206 Package size</td> <td></td> </tr> <tr> <td>/18 1812 Package size</td> <td></td> </tr> </table> <p><i>Note : Qualities of all Ceramic capacitors used in this schematic should be equal or better than X5R grade.</i></p>		/6 0603 Package size	/1 1% resistor	/8 0805 Package size	/X Not stuffed	/10 1210 Package size		/12 1206 Package size		/18 1812 Package size	
/6 0603 Package size	/1 1% resistor										
/8 0805 Package size	/X Not stuffed										
/10 1210 Package size											
/12 1206 Package size											
/18 1812 Package size											

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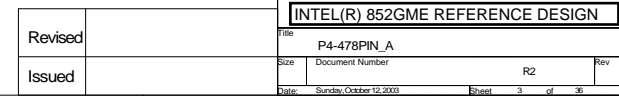
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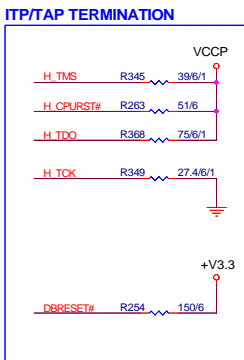
# BLOCK DIAGRAM



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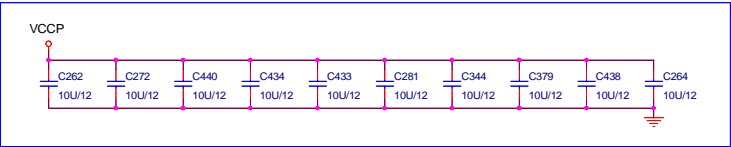




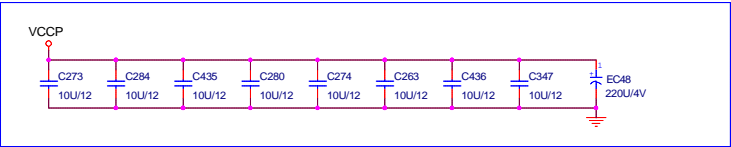


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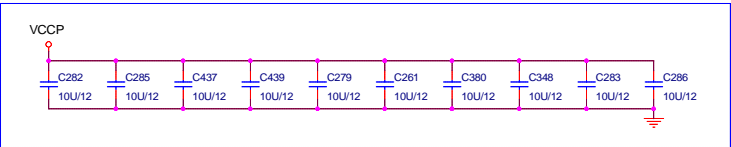
Put the cap on the North side of the processor



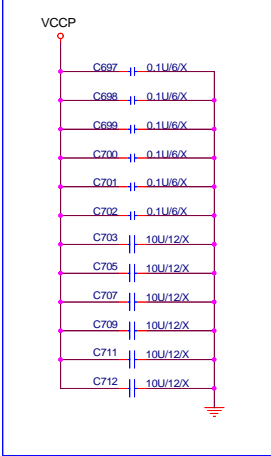
Put the cap in the processor cavity



Put the cap on the south side of the processor



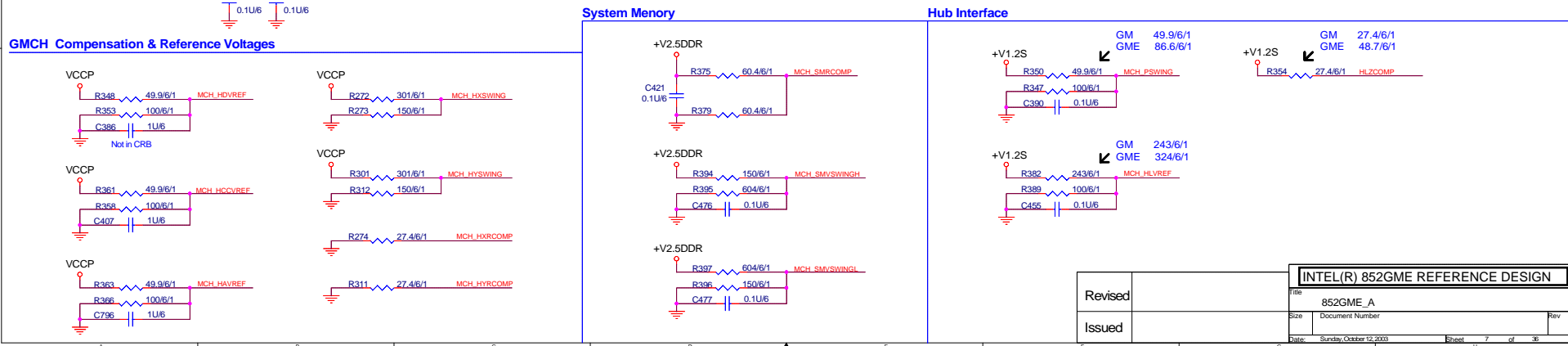
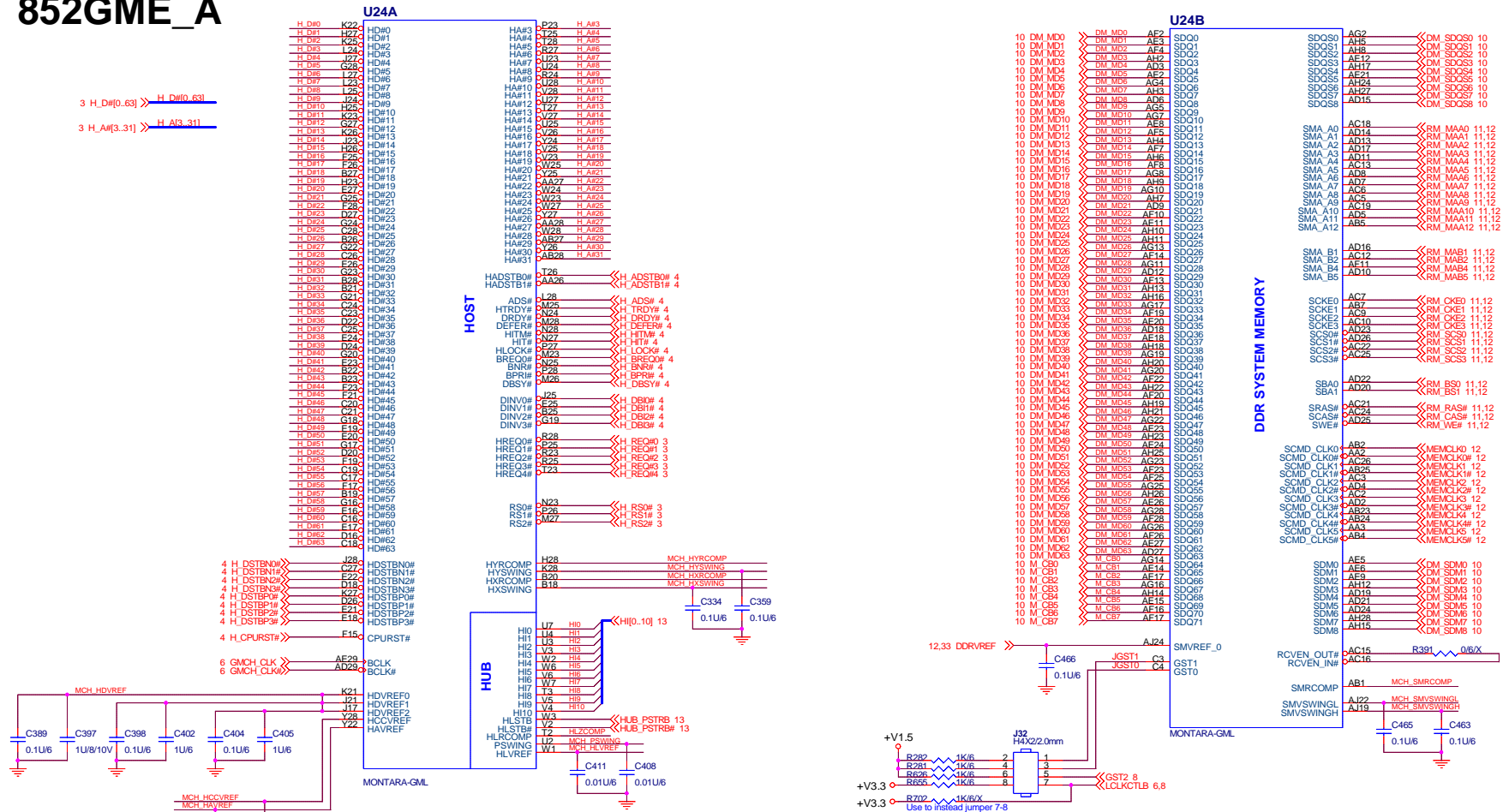
Reserve on CPU bottom side



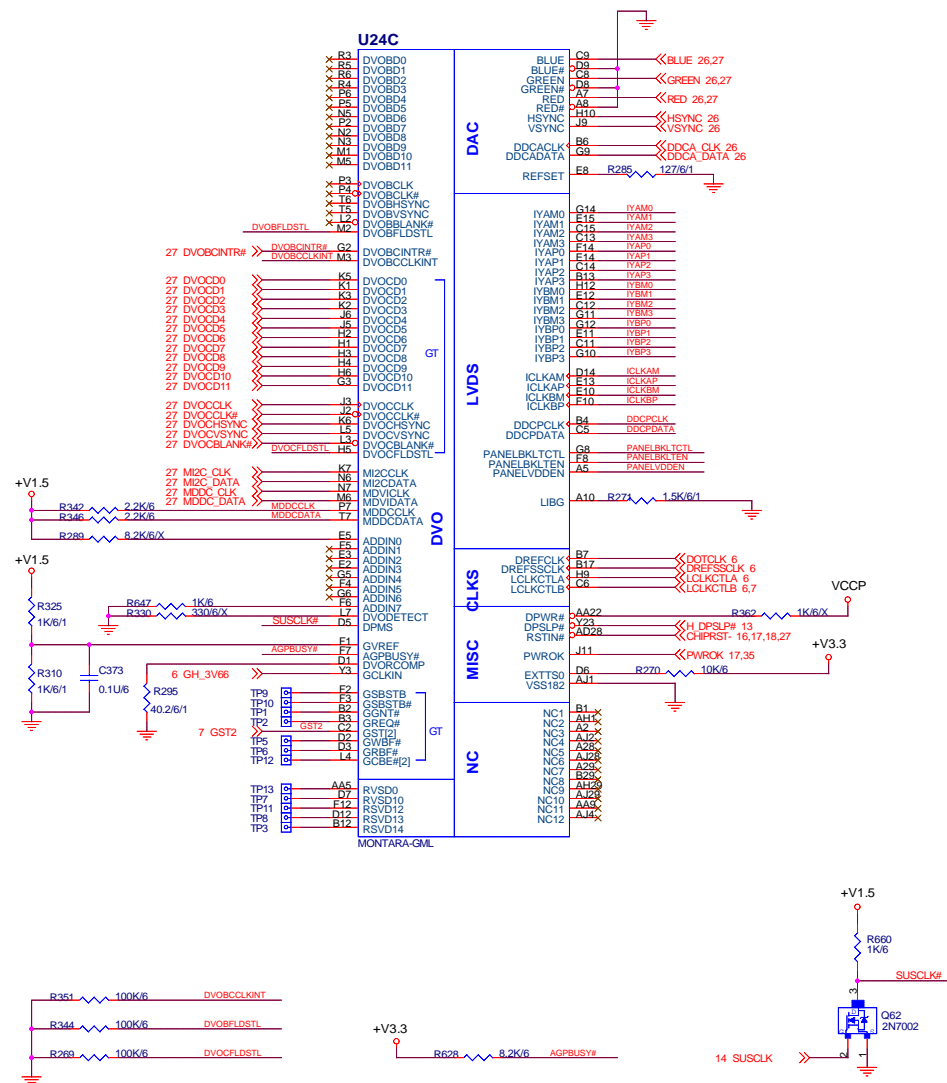
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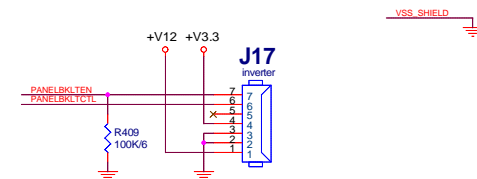
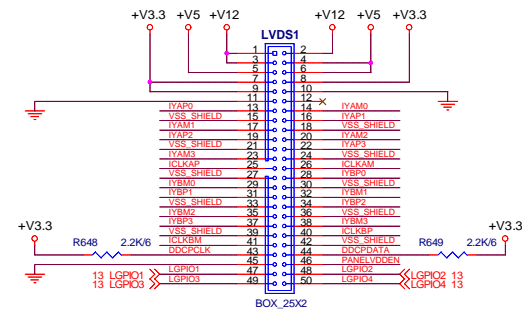
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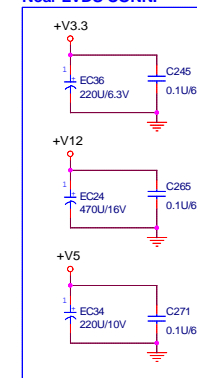
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## LVDS & Backlight Conn.

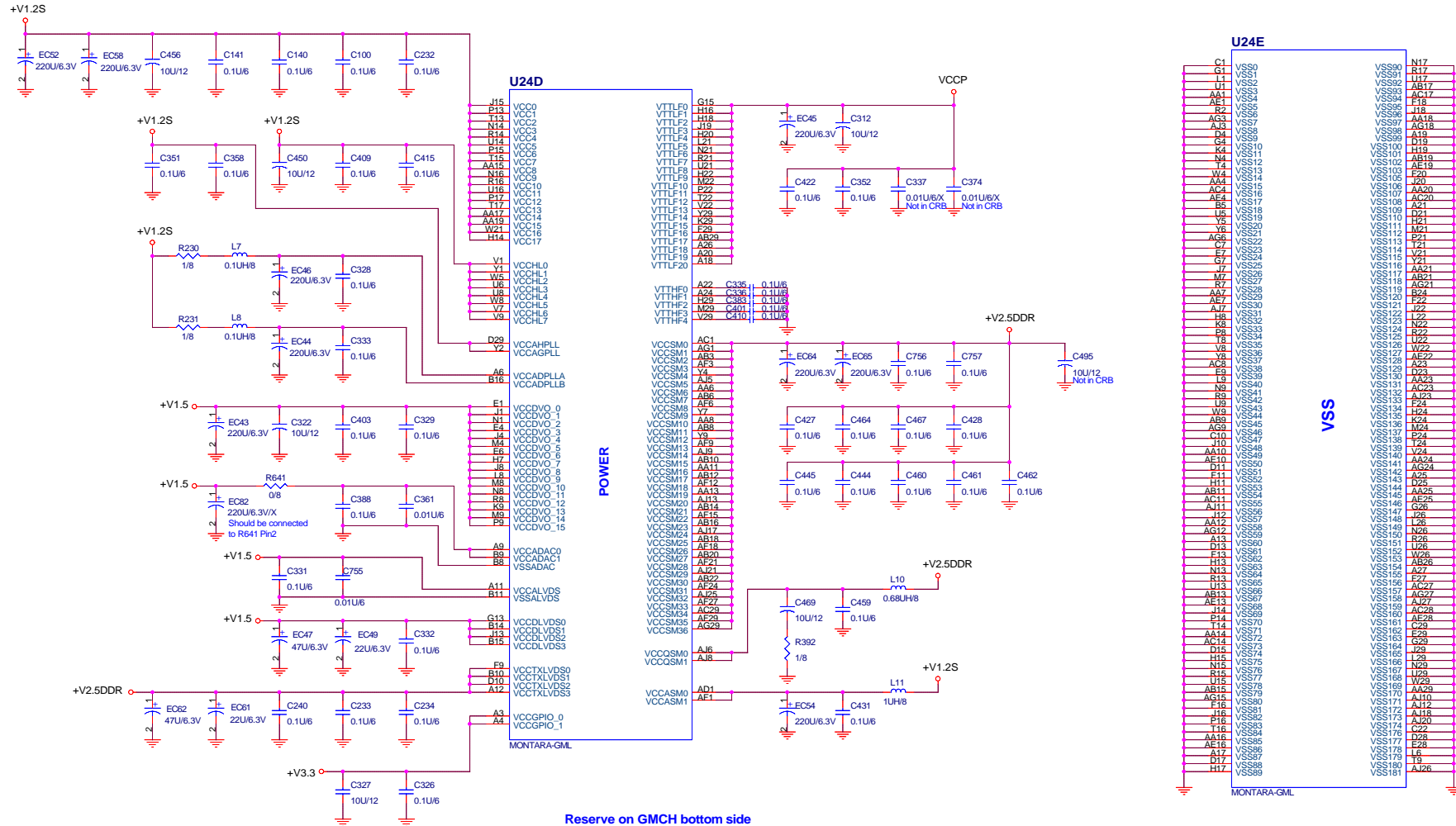


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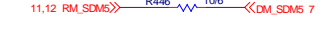
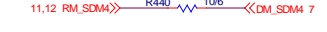
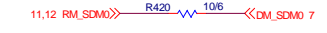
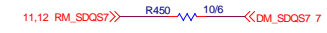
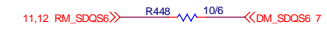
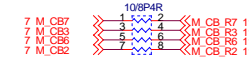
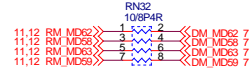
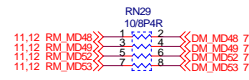
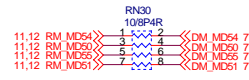
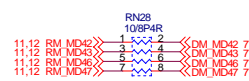
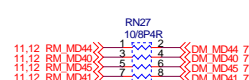
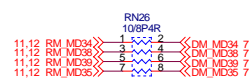
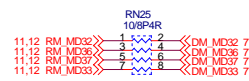
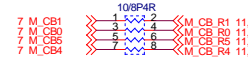
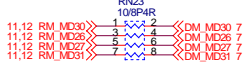
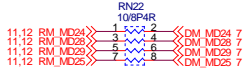
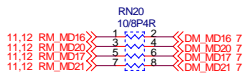
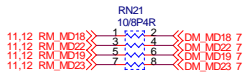
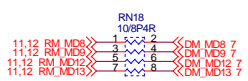
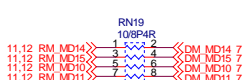
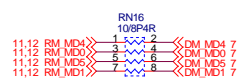
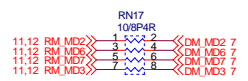


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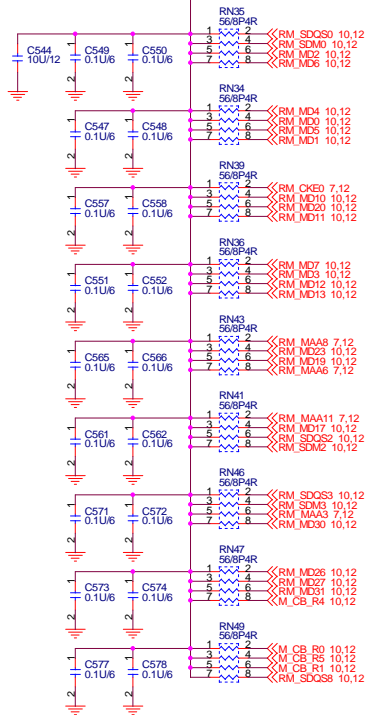
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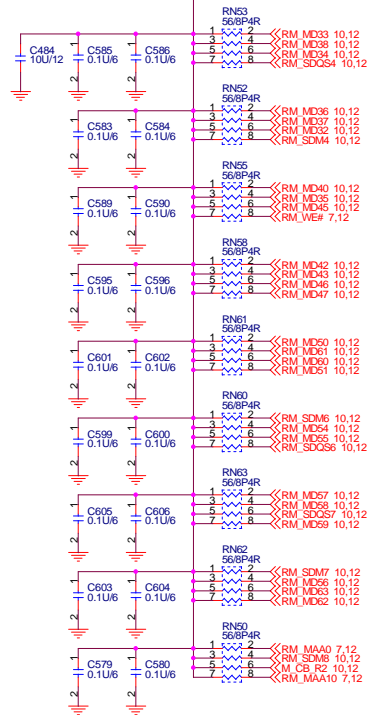
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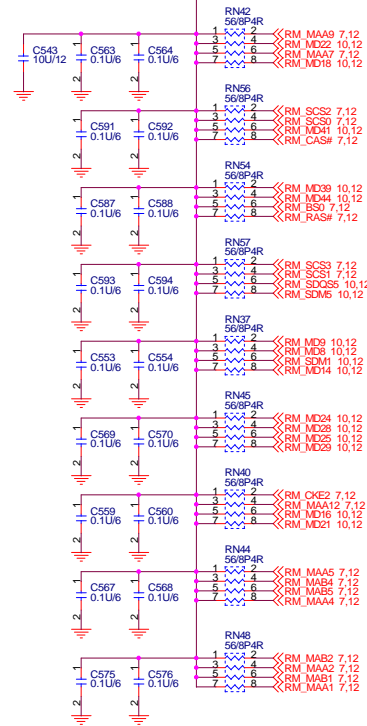
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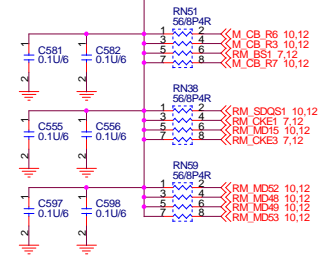
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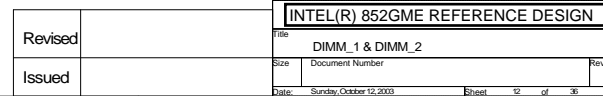
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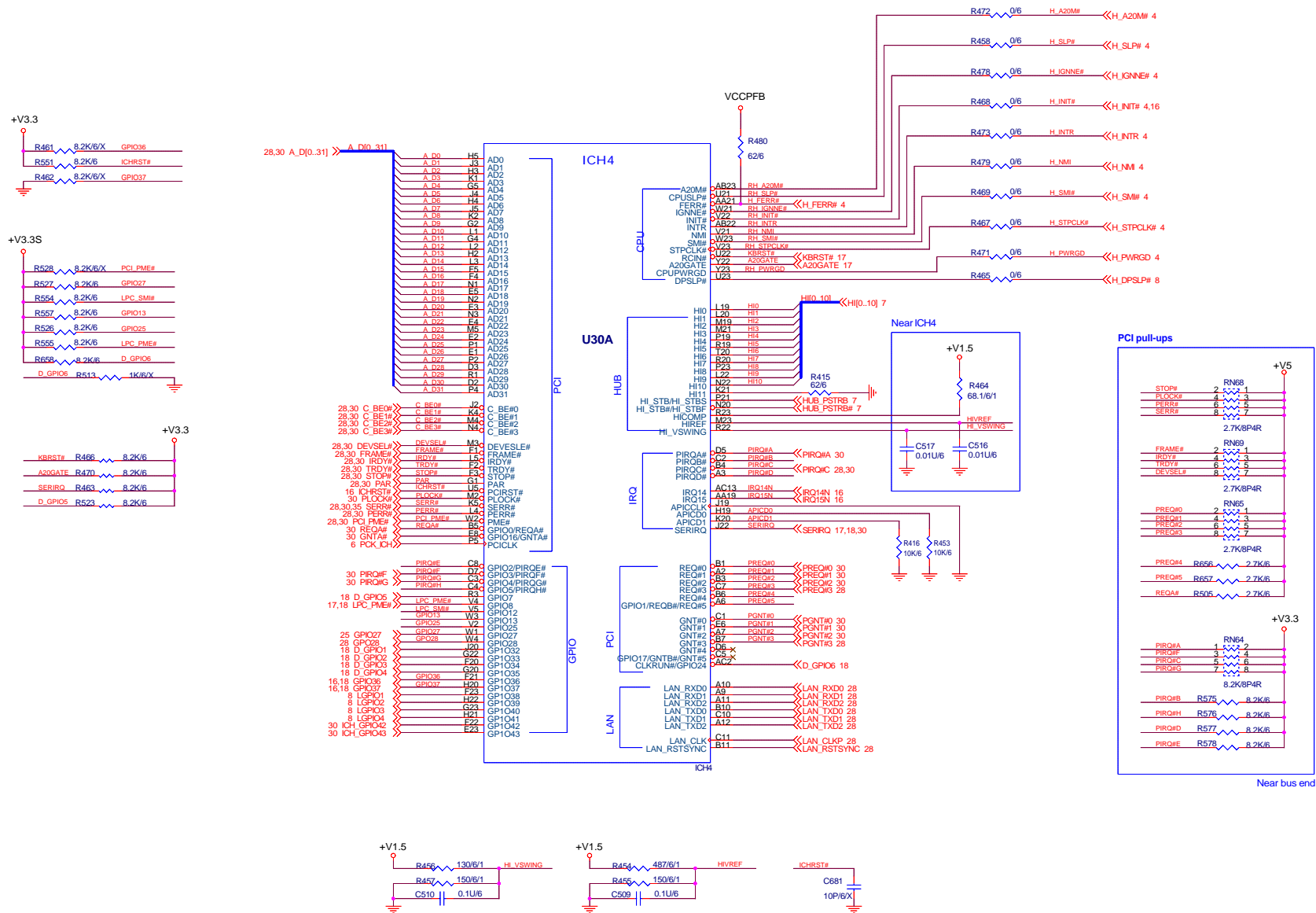
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**82801DB\_1**



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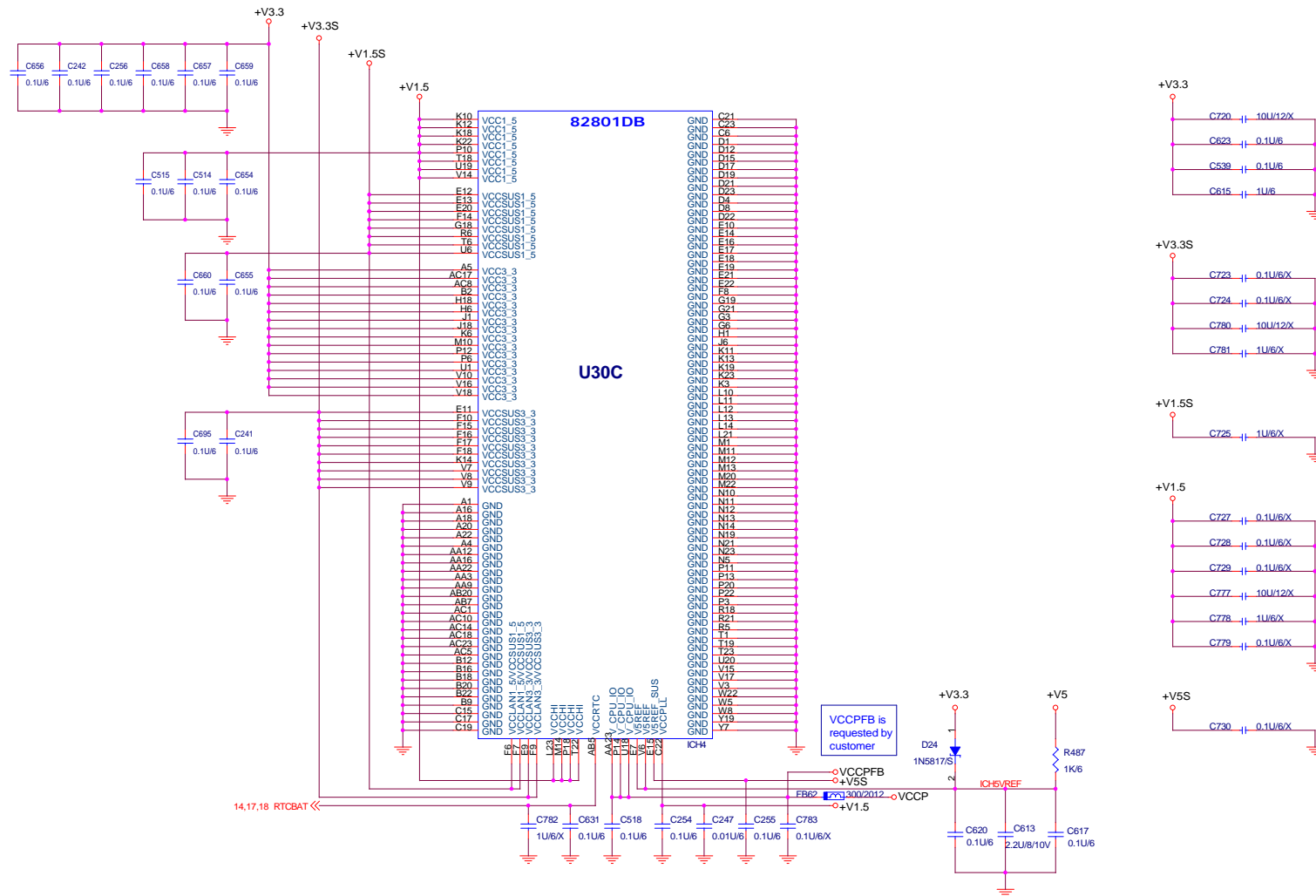
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J19	Function
Open	Case Closed
Short	Case Opened

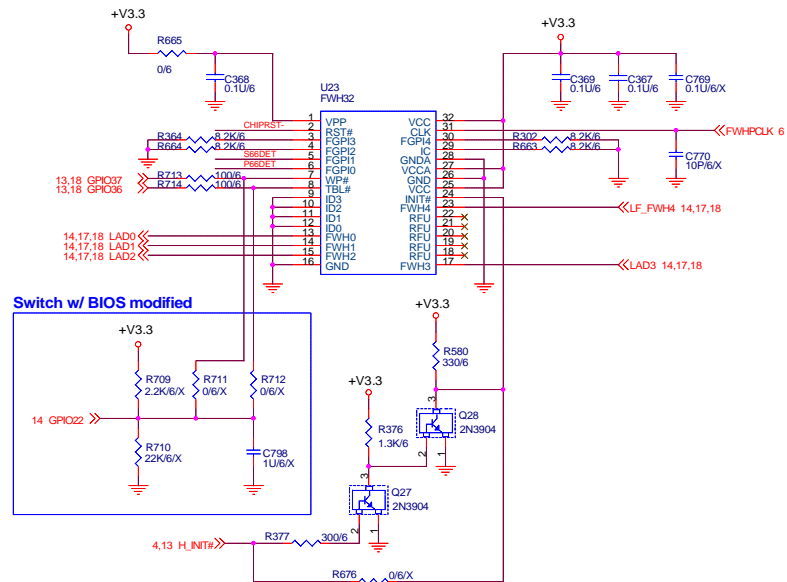
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**82801DB\_3**

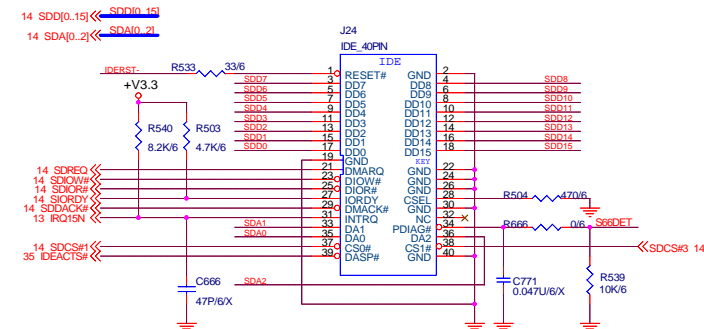
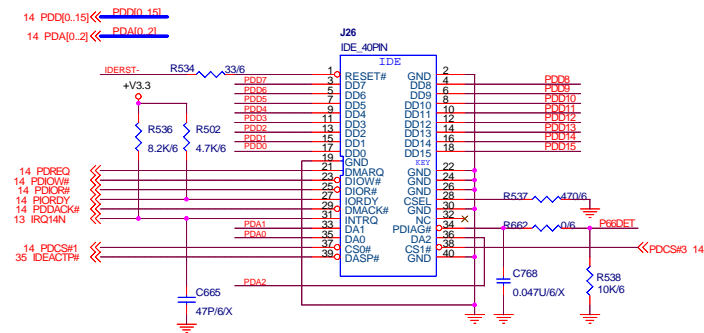
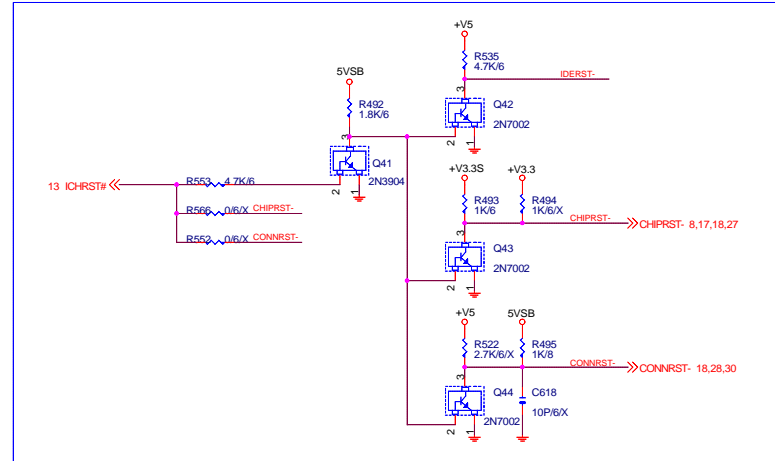


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## FirmWare Hub (FWH) Socket

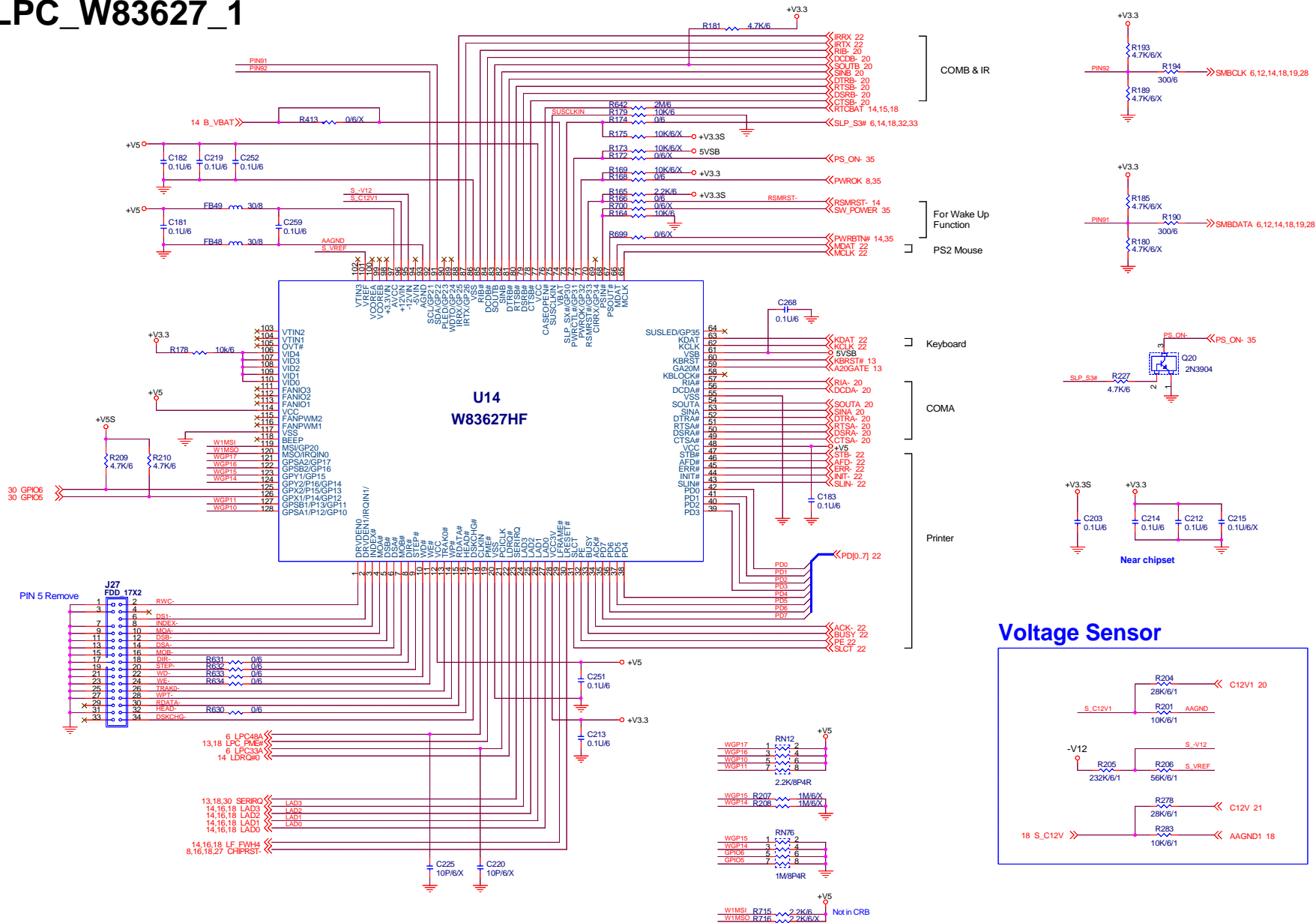


Near ICH4



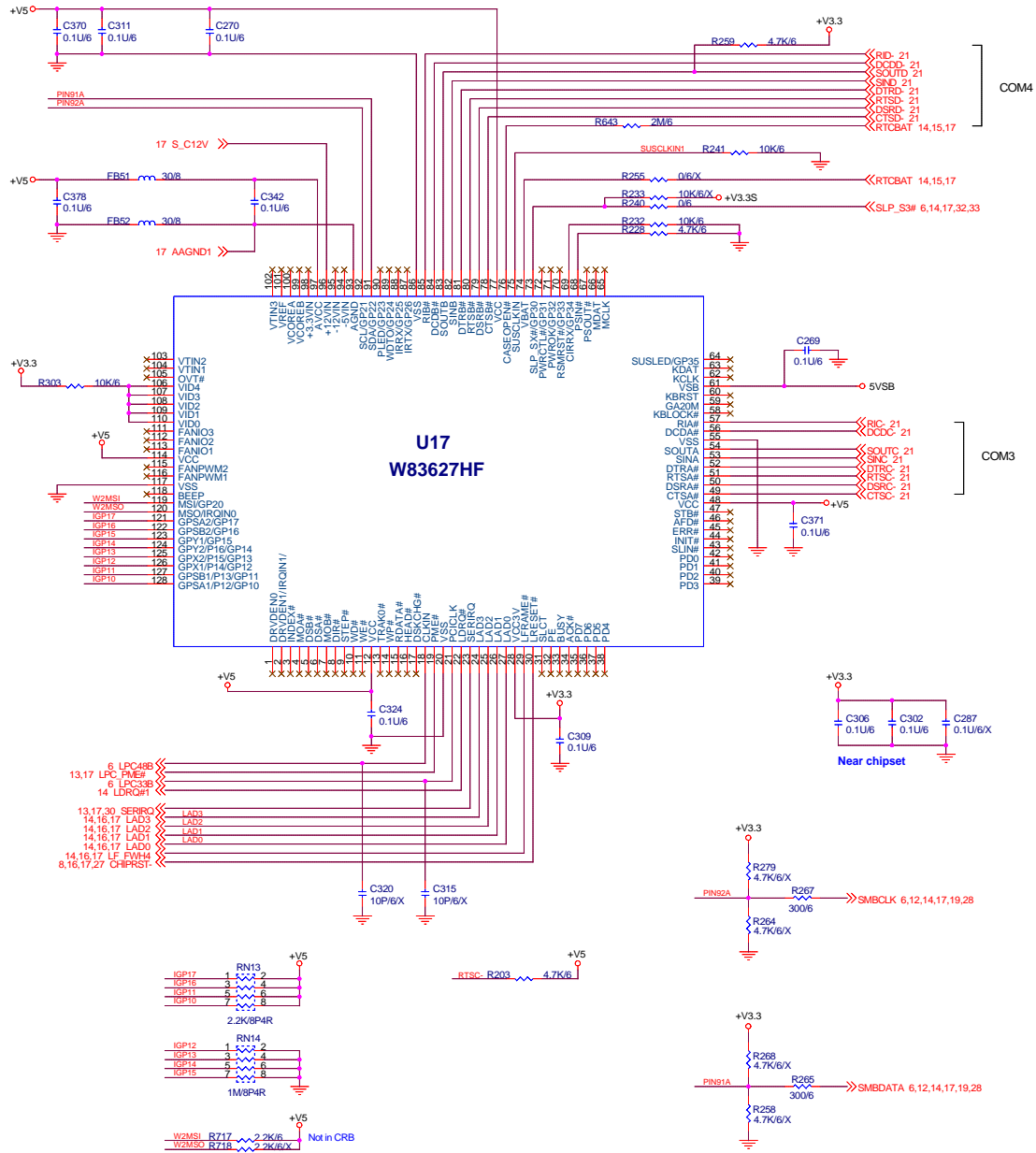
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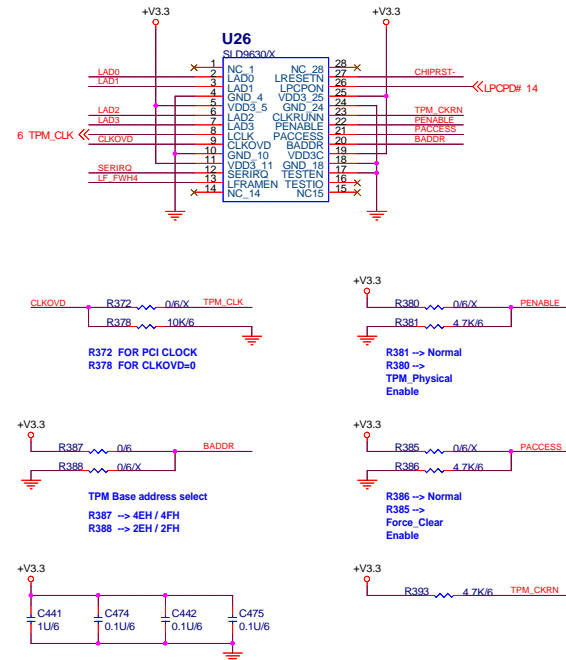


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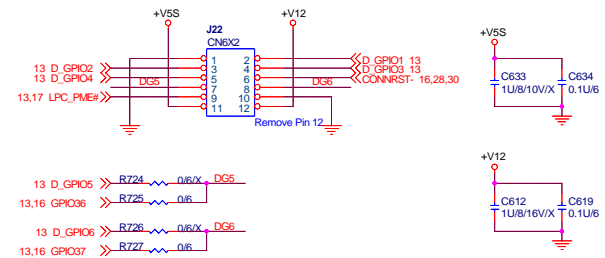
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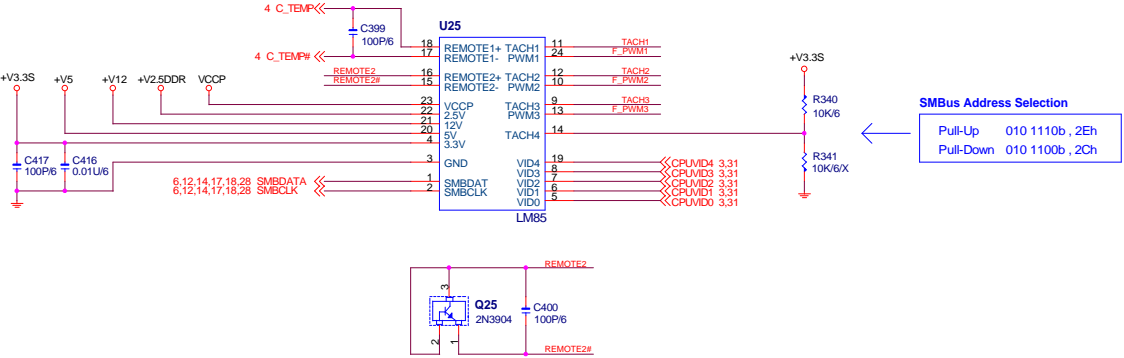
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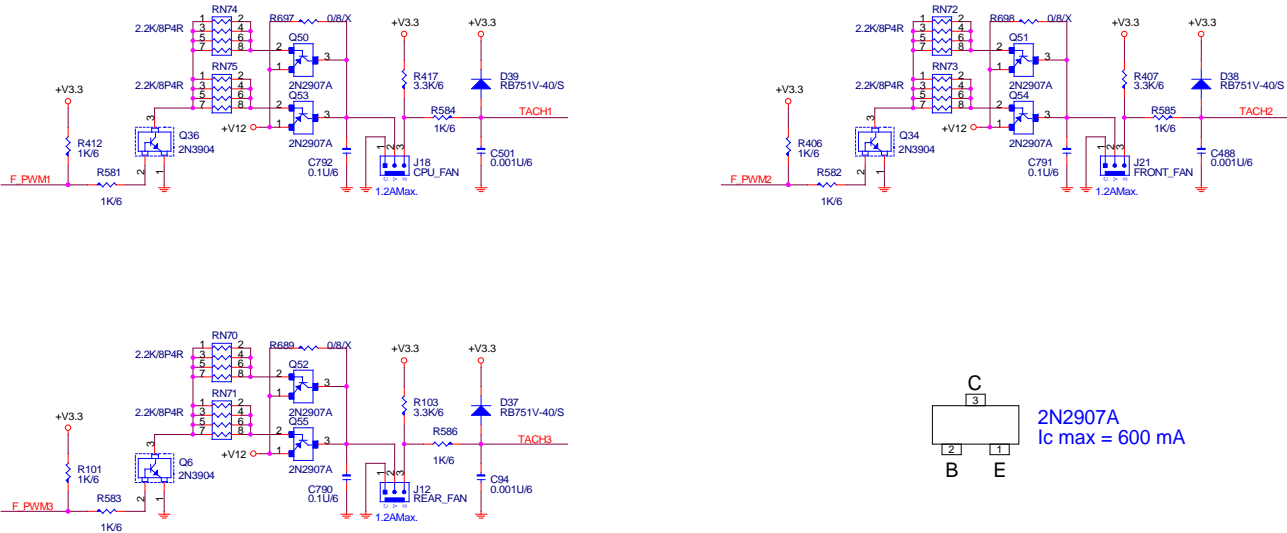
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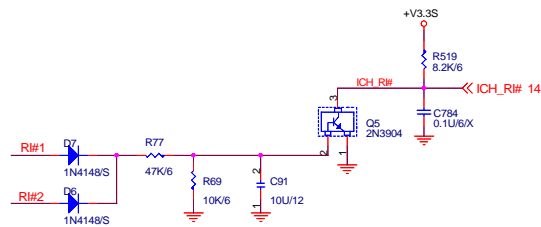
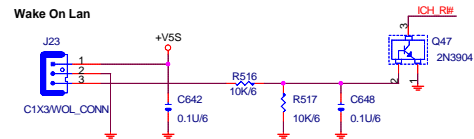
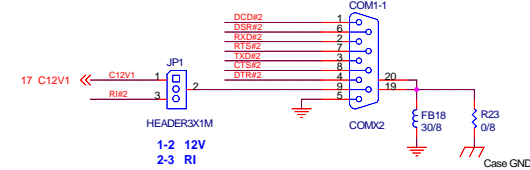
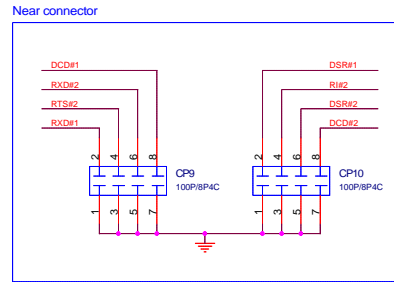
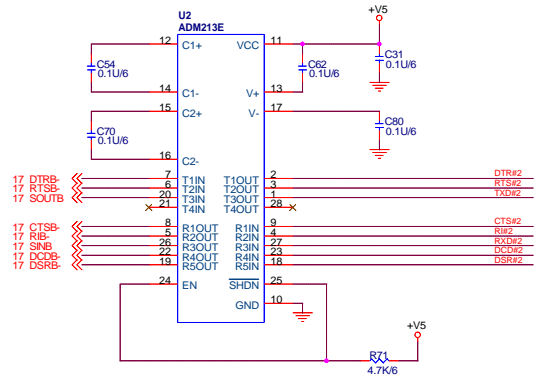
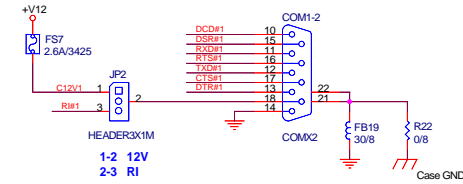
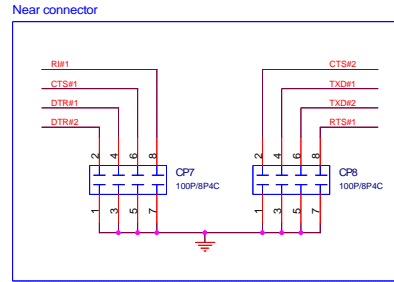
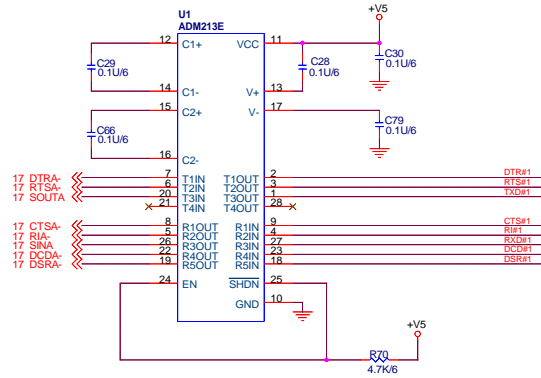
# HARDWARE MONITOR



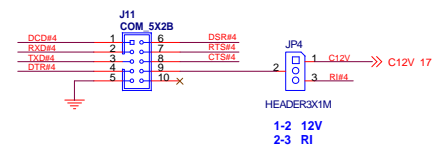
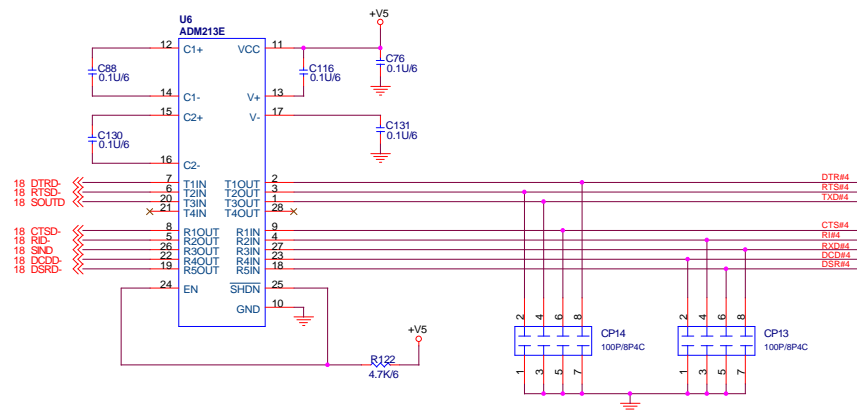
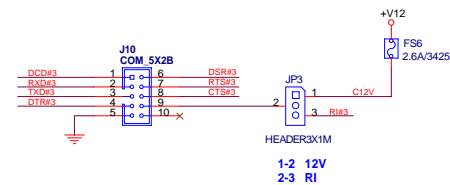
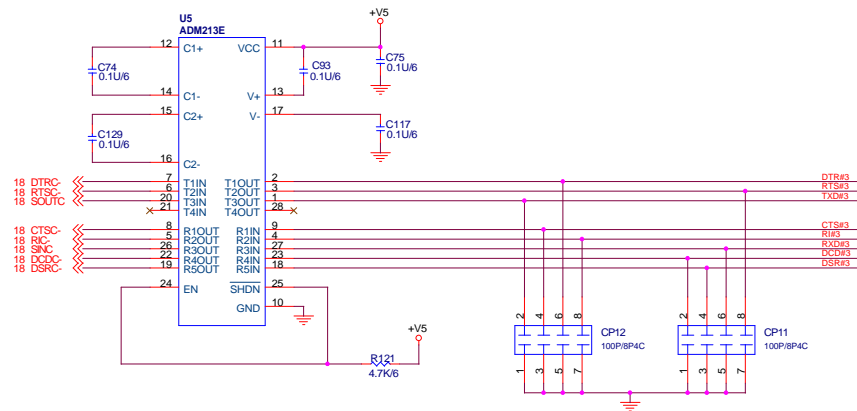
# FAN CONN.



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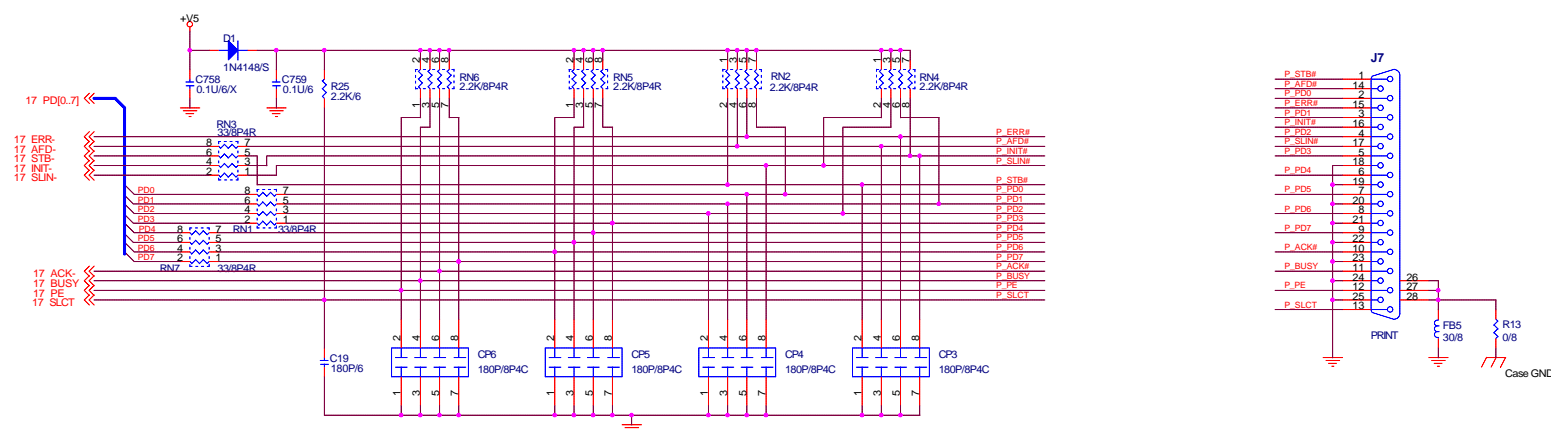


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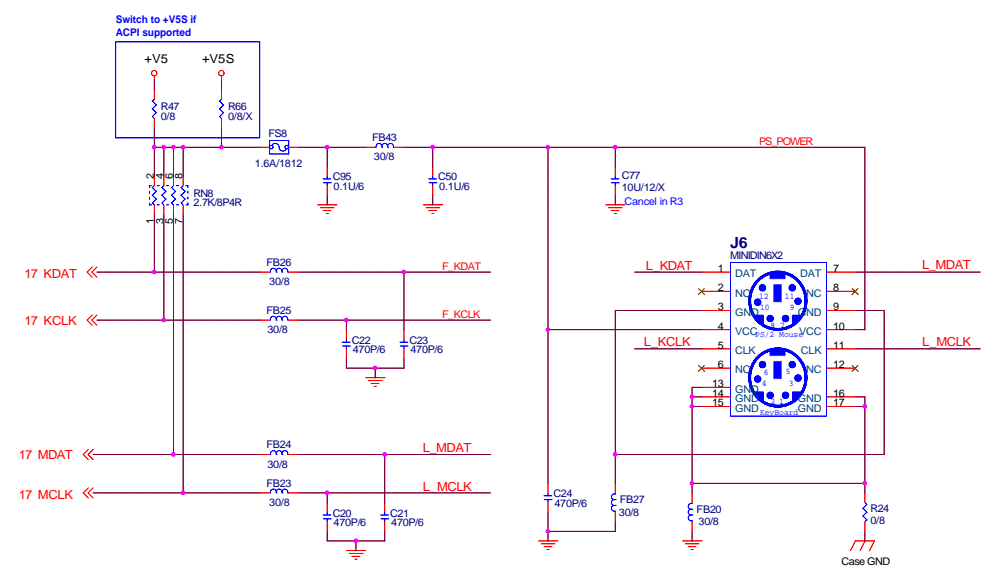


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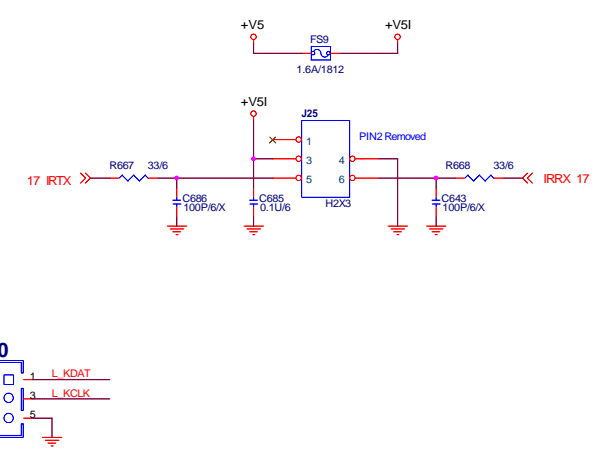
# Parallel Port Connector



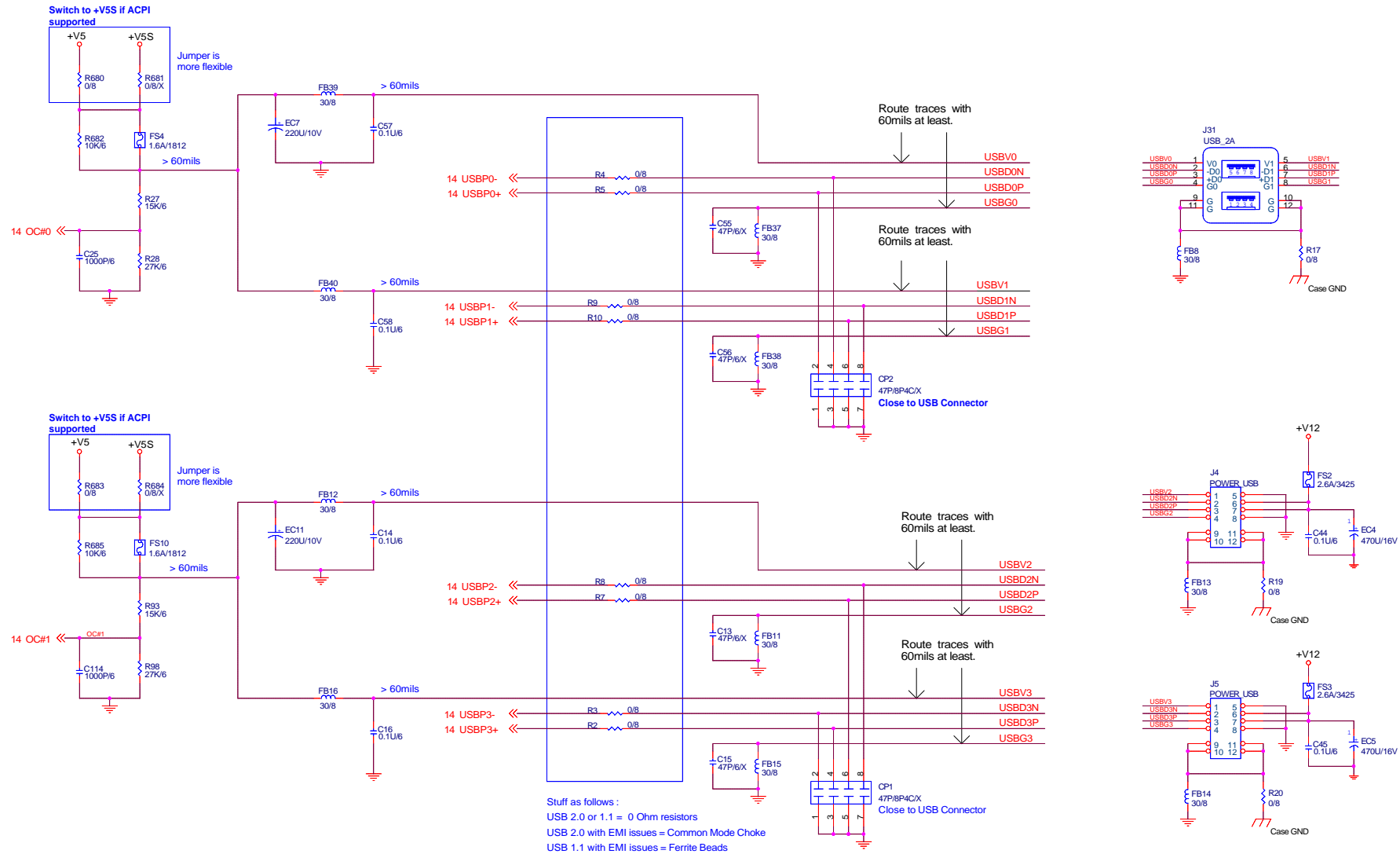
# K/B & M/S



# IR Connector

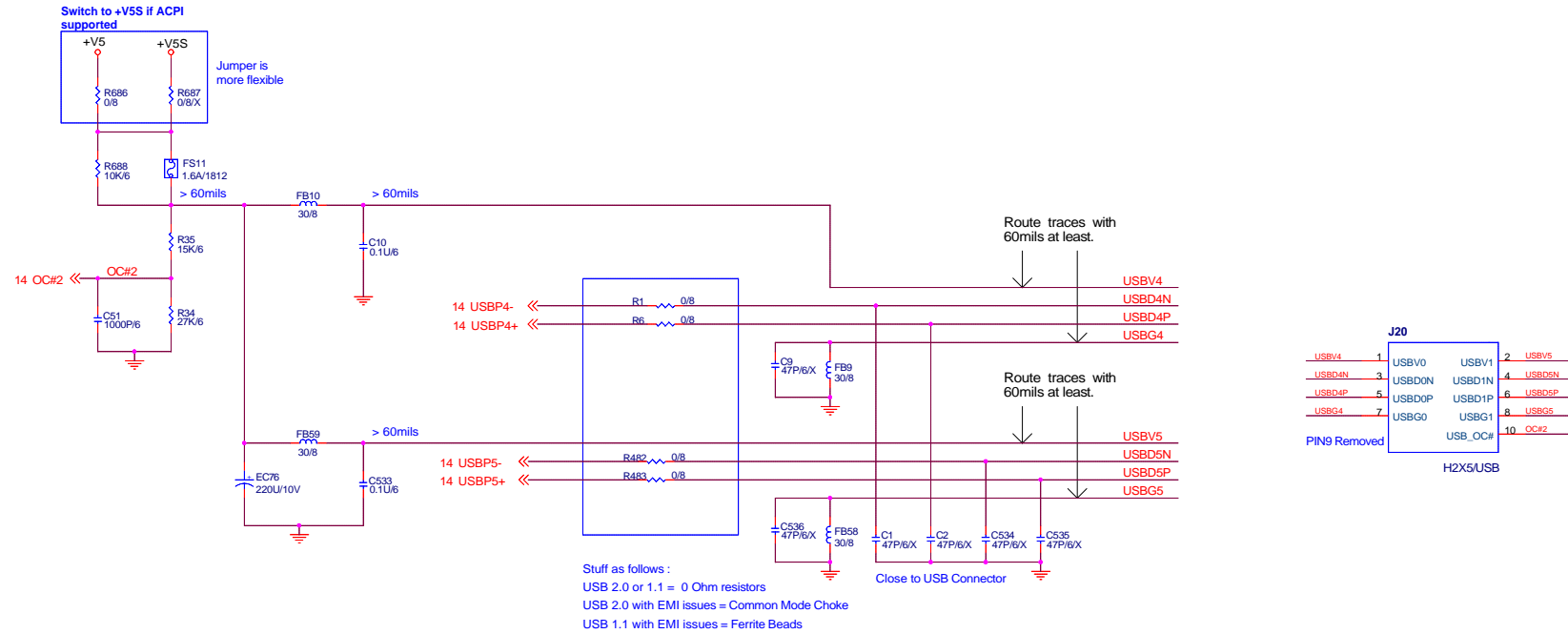


# USB\_1-4



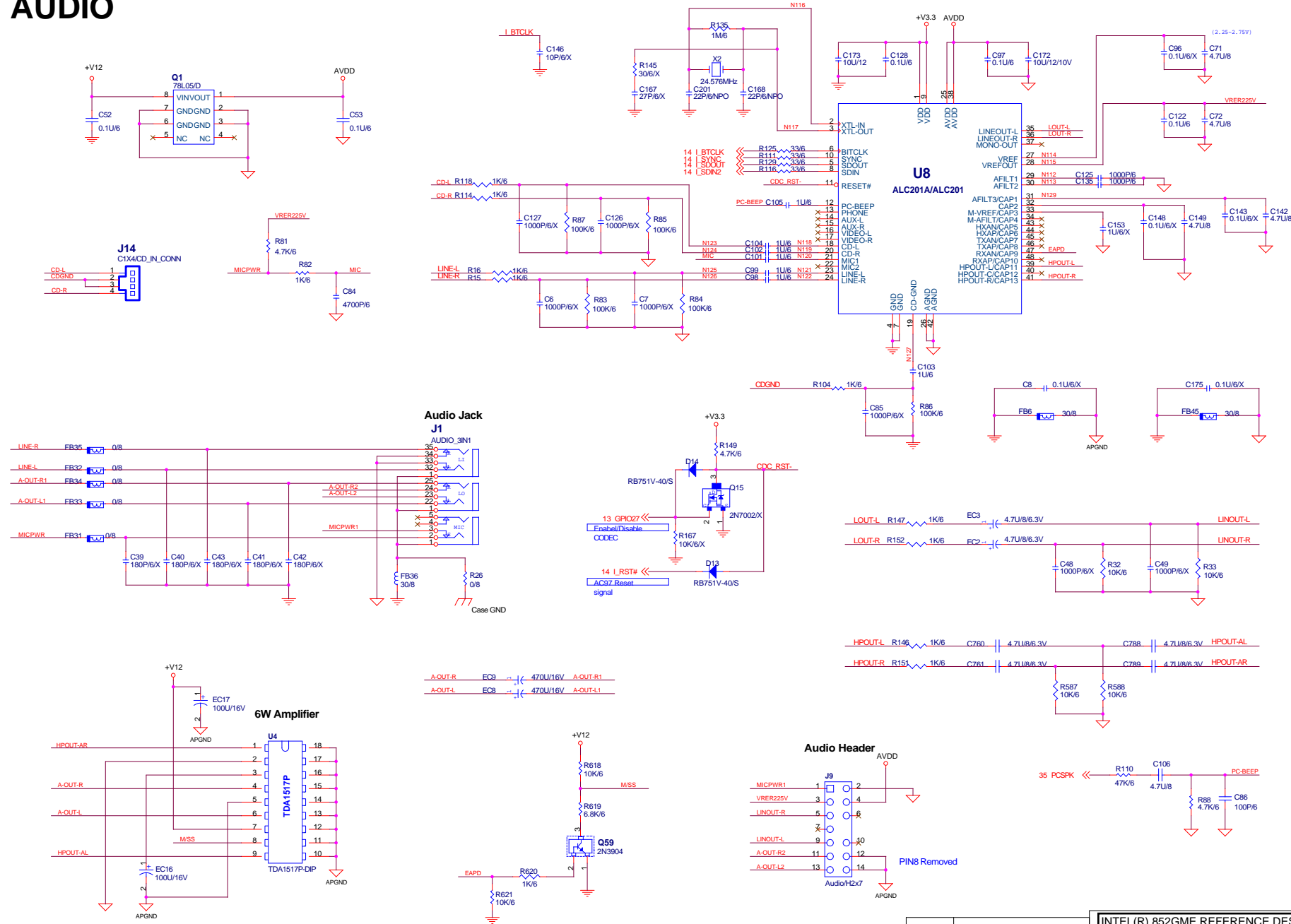
Revised		INTEL(R) 852GME REFERENCE DESIGN
Issued		File USB_1-4
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# USB\_5-6



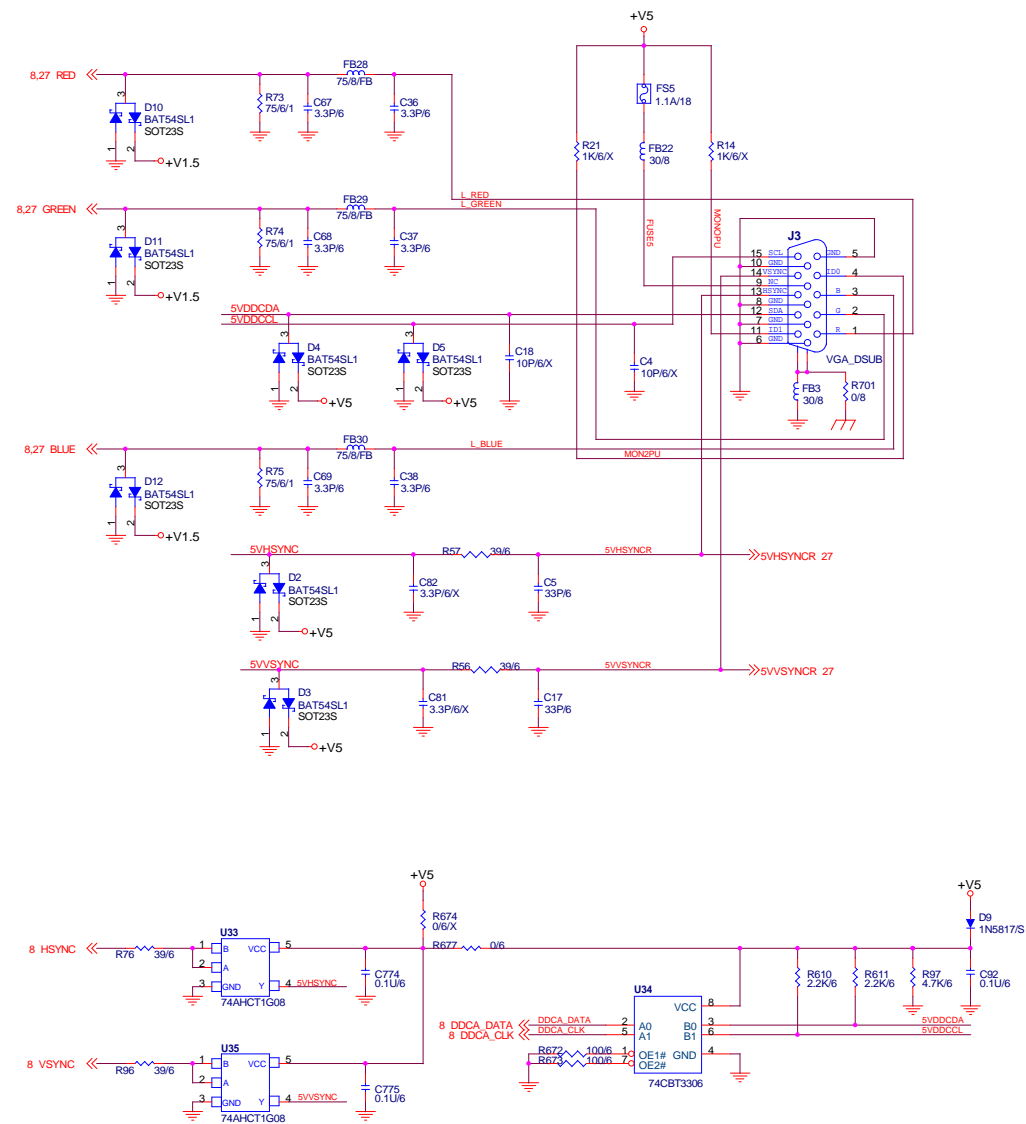
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Issued		File	USB_5-6
		Size	Document Number
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# AUDIO



		<b>INTEL(R) 852GME REFERENCE DESIGN</b>	
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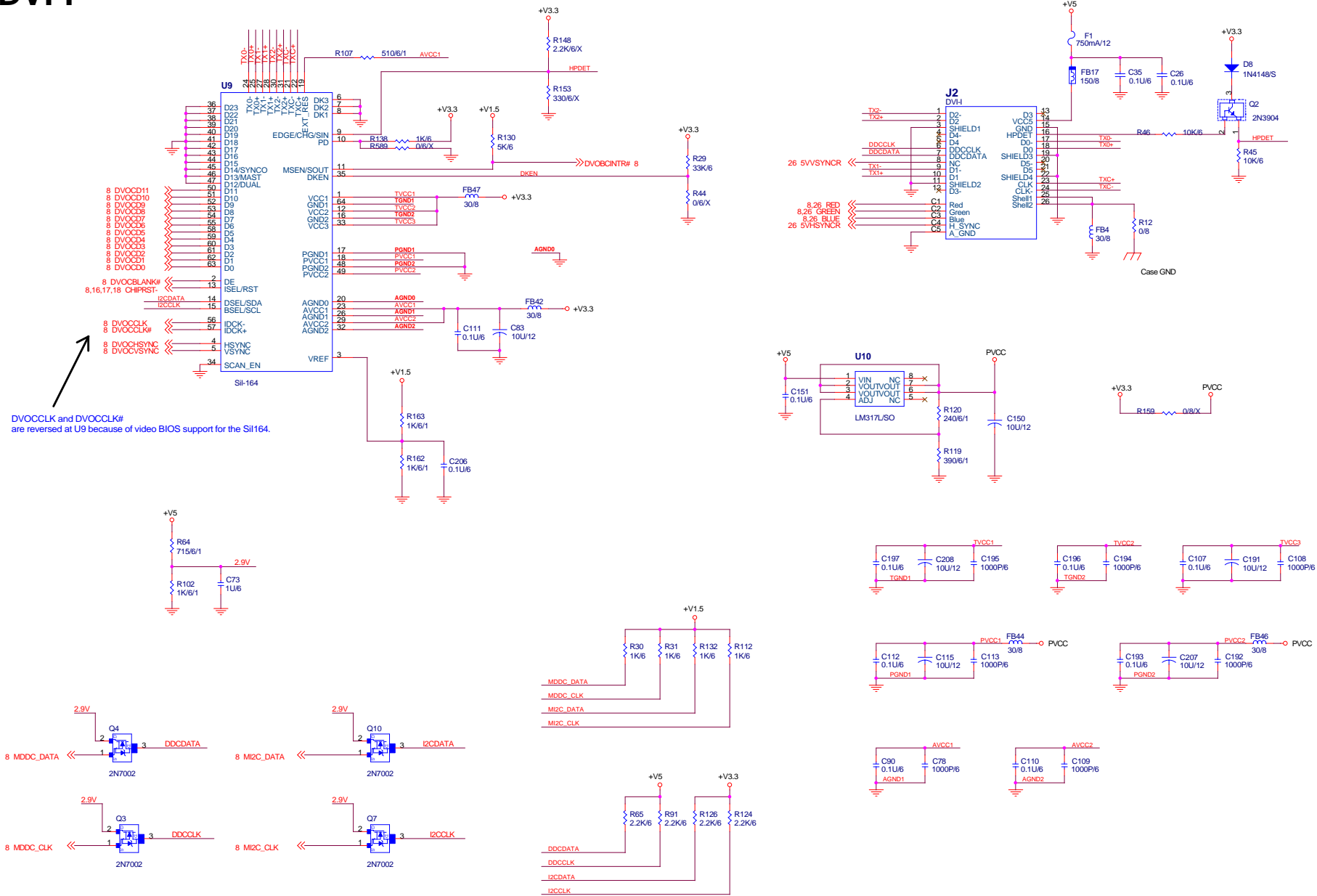
**CRT CONN.**



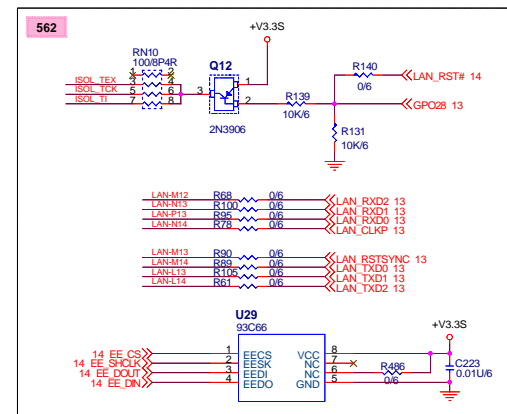
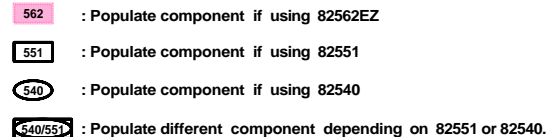
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	Title	CRT CONN.
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## DVI-I

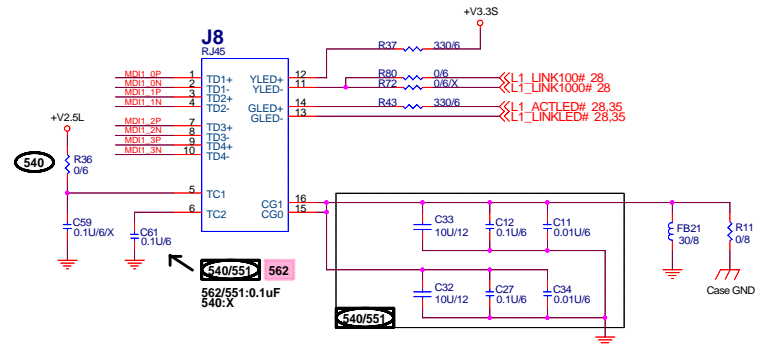
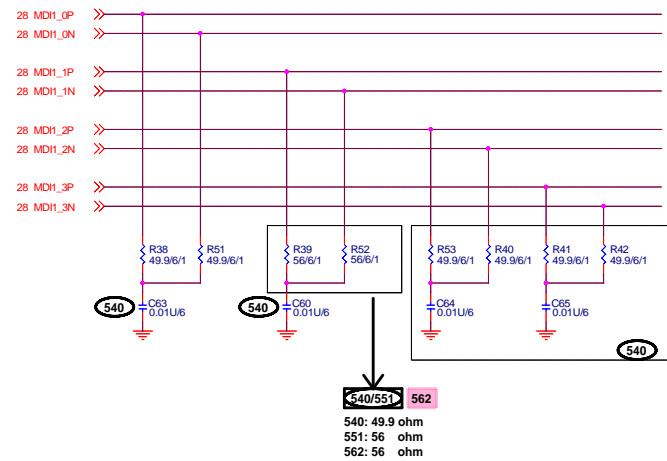


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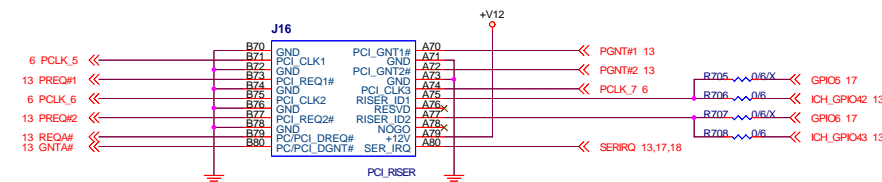
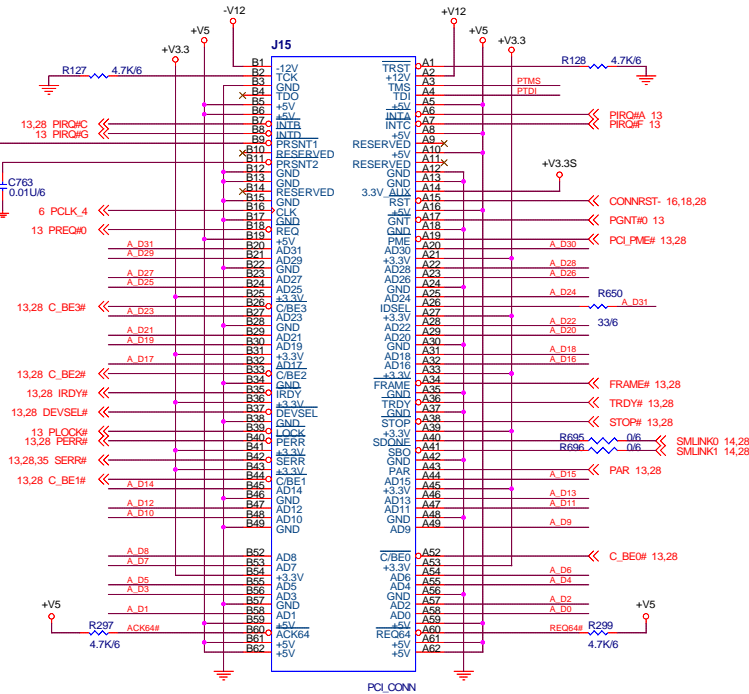
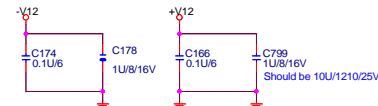
# LAN CONN.



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# PCI RISER

Equally allocate these capacitors among related power planes equally



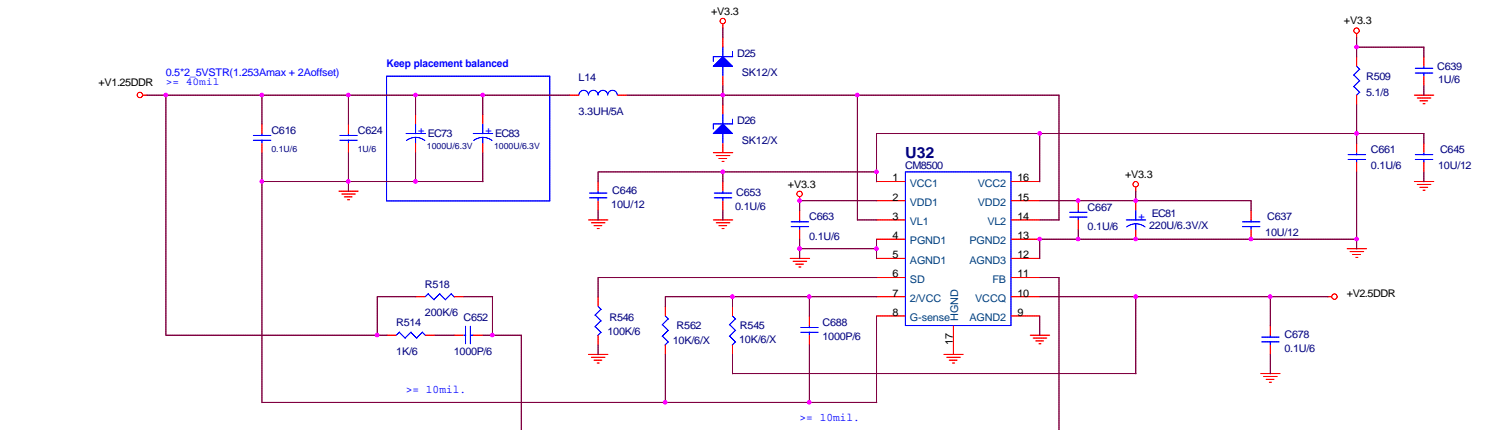
Slot 1: AD31, A.C.F.G, REQ#0, GNT#0  
Slot 2: AD29, C.F.G.A, REQ#1, GNT#1  
Slot 3: AD27, F.G.A.C, REQ#2, GNT#2

Revised		INTEL(R) 852GME REFERENCE DESIGN
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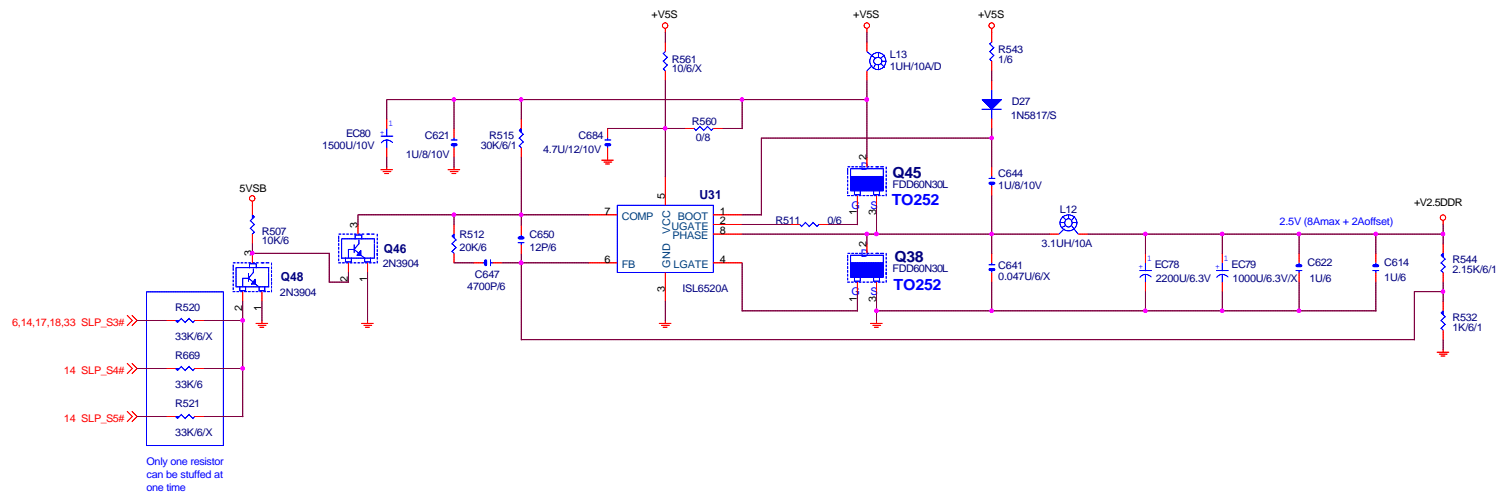
[illegible]

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## 1.25V DDR Termination Voltage

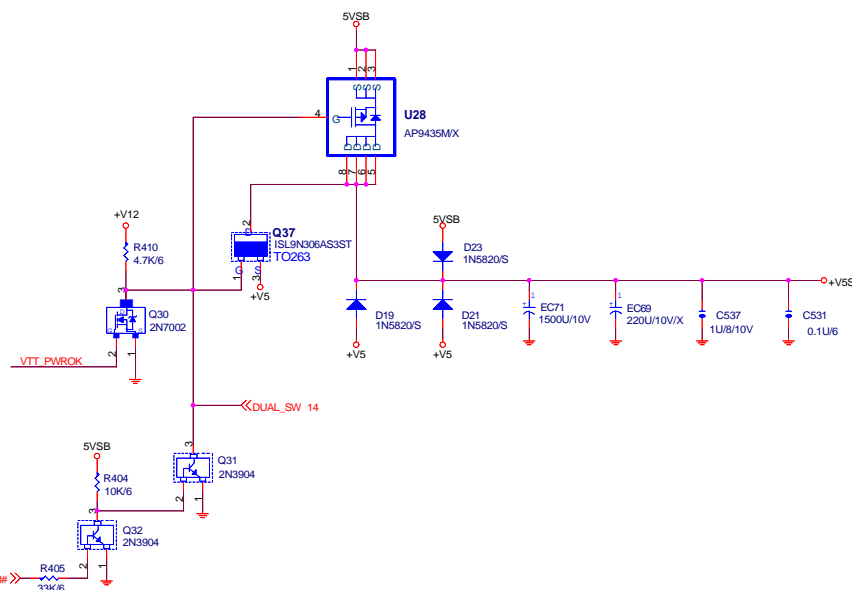
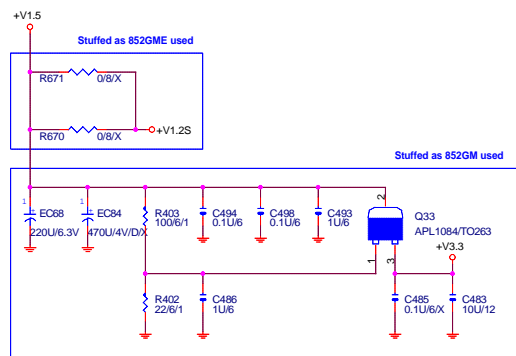
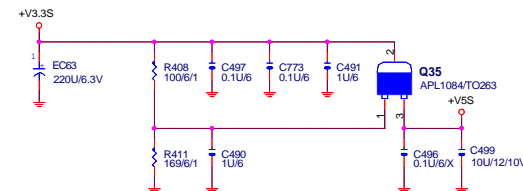
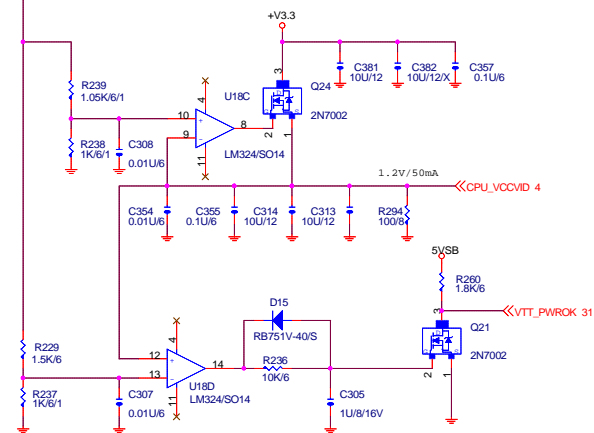
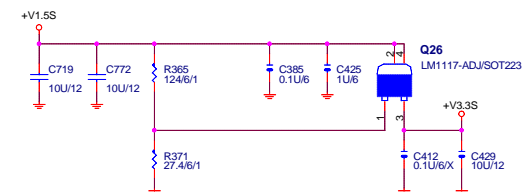
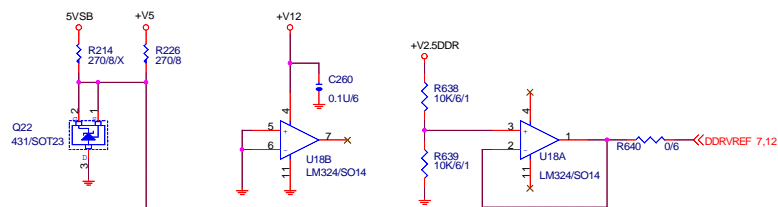


All the high-frequency decoupling capacitors should be allocated very closely to the main chip (CM8500), especially for the two capacitors at Pin 1 & Pin 16.



Only one resistor can be stuffed at one time

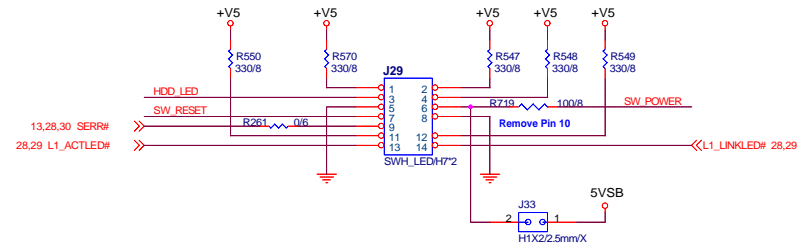
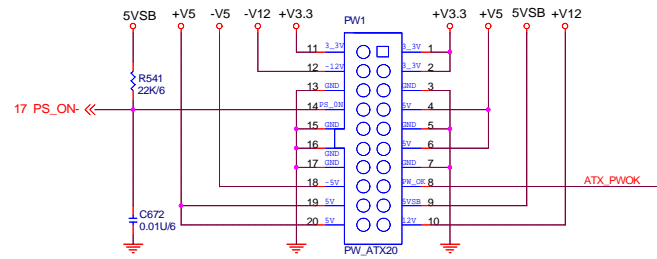
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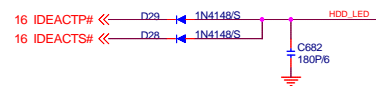
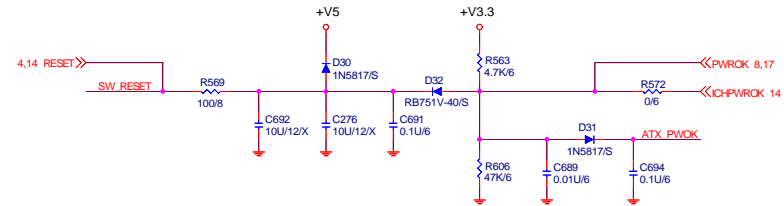
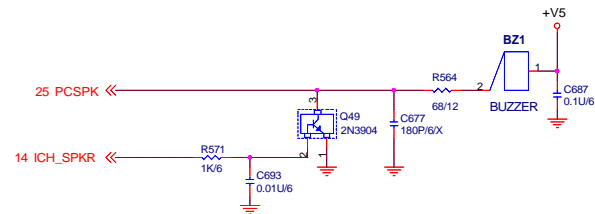
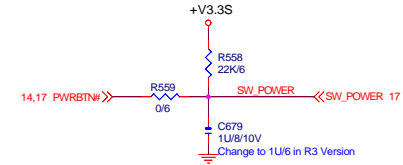
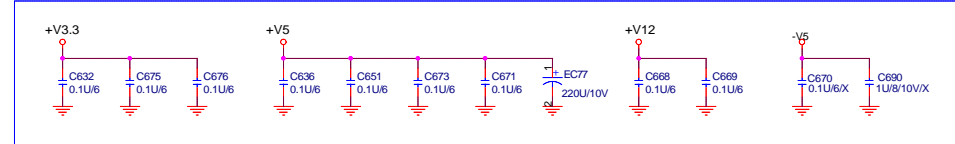
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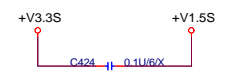
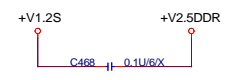
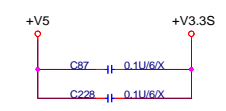
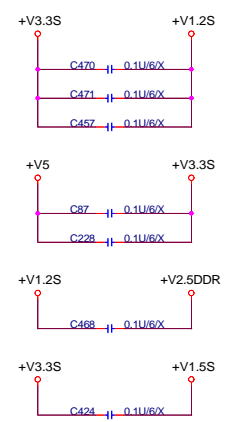
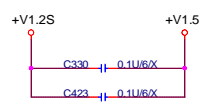
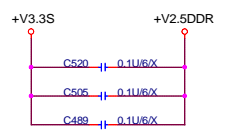
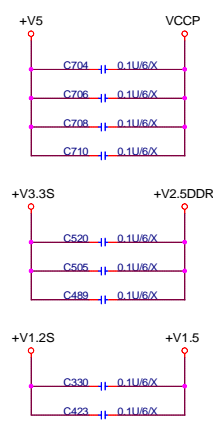
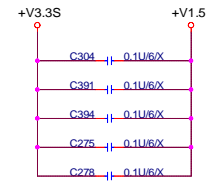
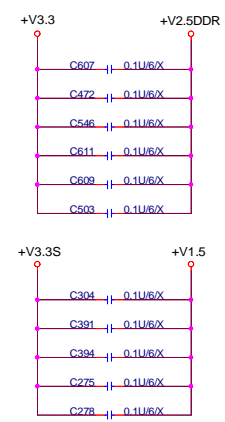
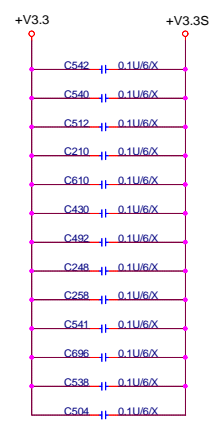
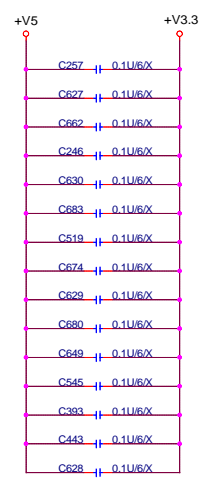
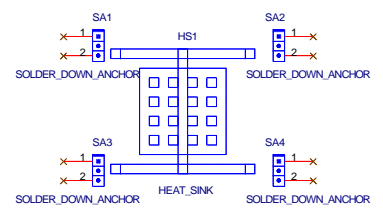
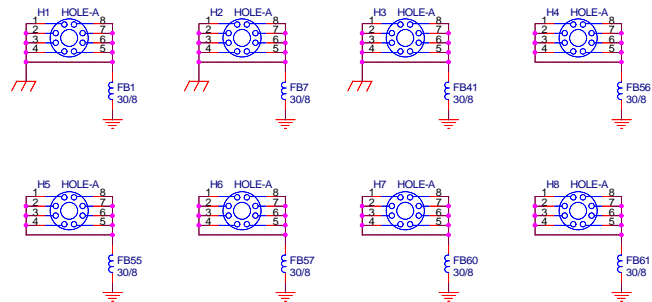




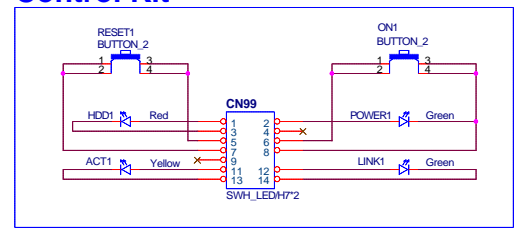
#### Near ATX Connector



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# Control Kit



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